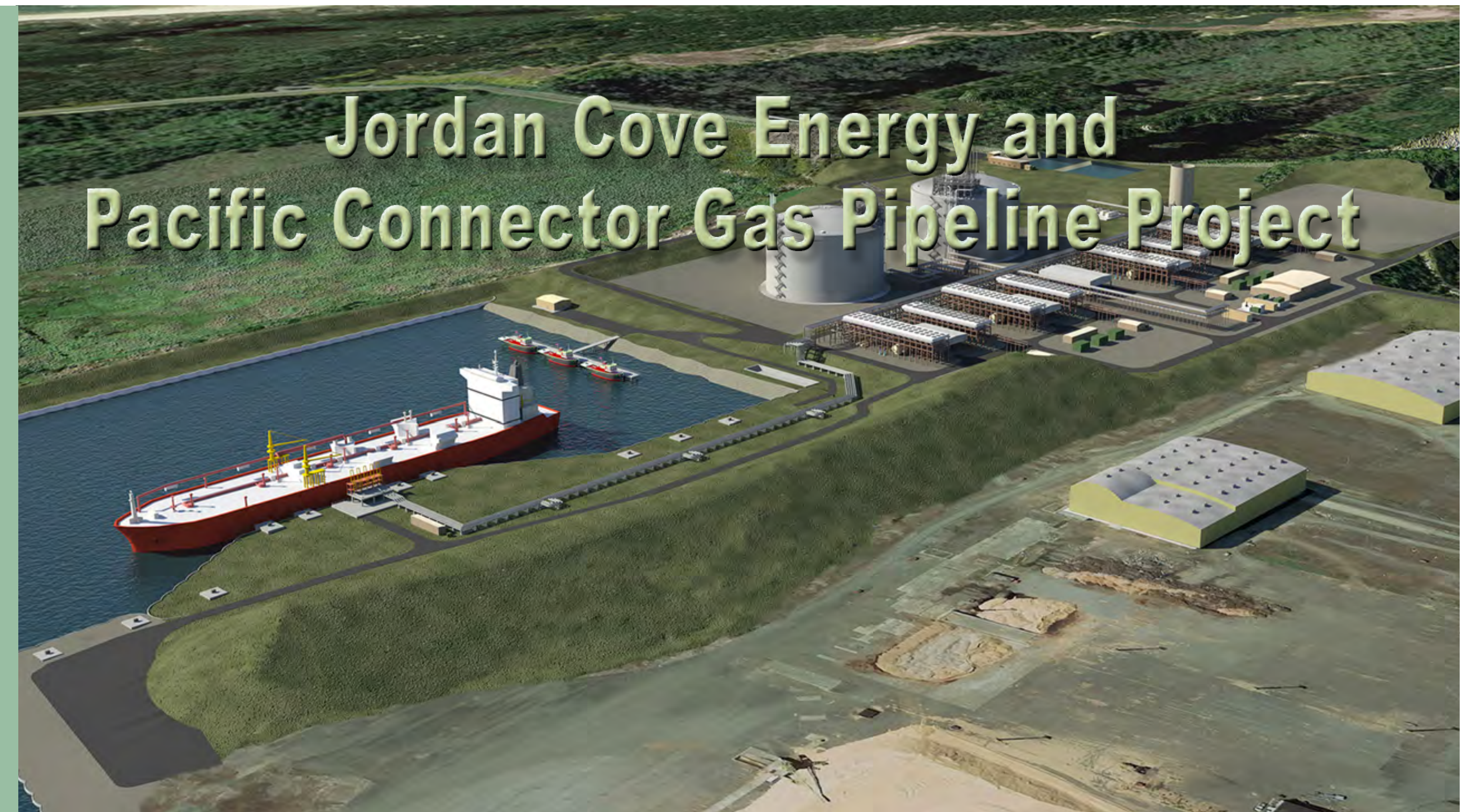
FERC/EIS 0256D

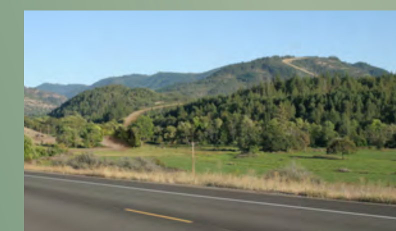
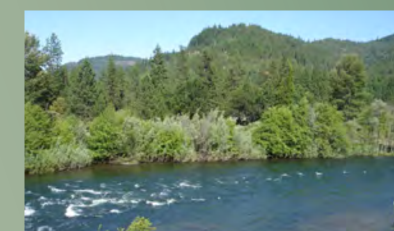
Jordan Cove Energy and Pacific Connector Gas Pipeline Project
Draft Environmental Impact Statement - Volume I

Docket Nos.
CP13-483-000
CP13-492-000

November 2014

Jordan Cove Energy and Pacific Connector Gas Pipeline Project



Draft Environmental Impact Statement

Volume I - Executive Summary; Chapters 1, 2, and 3; Chap. 4, sections 4.1 – 4.3

Jordan Cove Energy Project, L.P.
Docket No. CP13-483-000

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Cooperating Agencies
USDA Forest Service, Pacific Northwest Region
Department of the Army, Corps of Engineers, Portland District
US Department of Energy
US Environmental Protection Agency, Region 10
US Department of Homeland Security Coast Guard, Portland
US Department of Transportation, Pipeline and Hazardous Materials Safety Administration
US Department of the Interior Bureau of Land Management, Oregon State Office
US Department of the Interior Bureau of Reclamation, Klamath Basin Area Office
US Department of the Interior Fish and Wildlife Service, Oregon State Office

Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 3
Jordan Cove Energy Project, L.P.
Docket No. CP13-483-000
Pacific Connector Gas Pipeline, L.P.
Docket No. CP13-492-000
FERC/EIS-0256D

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this draft environmental impact statement (EIS) for the natural gas facilities (collectively referred to as the Project) proposed by Jordan Cove Energy Project, L.P. (Jordan Cove) and Pacific Connector Gas Pipeline, L.P. (Pacific Connector) in the above-referenced dockets. The Project facilities would be located in Coos, Douglas, Jackson, and Klamath Counties, Oregon, and are designed to export an equivalent of about 0.9 billion cubic feet per day of natural gas to customers around the Pacific Rim.

The draft EIS assesses the potential environmental effects of the construction and operation of the Project in accordance with the requirements of the National Environmental Policy Act (NEPA). The FERC staff concludes that approval of the Project would result in some limited adverse environmental impacts. However, if the Project is constructed and operated in accordance with applicable laws and regulations, and with implementation of Jordan Cove's and Pacific Connector's proposed mitigation measures, and the additional mitigation measures recommended by the FERC staff and federal land managing agencies in this EIS, environmental impacts would be substantially reduced.

The United States (U.S.) Department of Agriculture Forest Service (Forest Service); U.S. Army Corps of Engineers; U.S. Department of Energy; U.S. Environmental Protection Agency; U.S. Department of Homeland Security Coast Guard (Coast Guard); U.S. Department of the Interior Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation), and Fish and Wildlife Service; and the Pipeline and Hazardous Materials Safety Administration within the U.S. Department of Transportation participated as cooperating agencies in preparation of this EIS. Cooperating agencies have jurisdiction by law or special expertise with respect to resources potentially affected by the proposal and participate in the NEPA analysis.

The BLM, with the concurrence of the Forest Service and Reclamation, would adopt and use the EIS to consider issuing a Right-of-Way Grant for the portion of the Project on federal lands. Both the BLM and the Forest Service would also use this EIS to evaluate proposed amendments to their District or National Forest land management plans to make provision for the Pacific Connector pipeline. Other cooperating agencies would use this EIS in their regulatory process, and to satisfy compliance with the NEPA and other related federal environmental laws and regulations. Although the cooperating agencies provided input to the conclusions and recommendations presented in the EIS, the agencies would present their own conclusions and recommendations in their respective Records of Decision for the Project.

The draft EIS addresses the potential environmental effects associated with the construction and operation of the Project facilities. Jordan Cove's proposal would include LNG vessel transit using a waterway to and from the export terminal; an access channel between the existing Coos Bay navigation channel and the Jordan Cove terminal marine slip; the slip, tug boat berth, and LNG vessel berth and loading platform; transfer pipeline; two LNG storage tanks; four liquefaction trains and associated refrigerant storage bullets; fire water ponds; ground flares; 420-megawatt South Dune Power Plant; support buildings; utility and access corridor between the terminal and the power plant; Southwest Oregon Resource Security Center; and a natural gas treatment plant.

The Pacific Connector proposal would consist of a 232-mile-long, 36-inch-diameter underground welded steel pipeline between Malin and Coos Bay; the 41,000 horsepower Klamath Compressor Station; the Klamath-Eagle Receipt Meter Station and Klamath-Beaver Receipt Meter Station within the compressor station tract; Clarks Branch Delivery Meter Station at the interconnection with Northwest Pipeline's Grants Pass Lateral; the Jordan Cover Delivery Meter Station at the interconnection with the Jordan Cove LNG terminal; 5 pig[1] launchers and receivers; 17 mainline block valves; and 11 communication towers co-located with other facilities.

The FERC mailed copies of the draft EIS to federal, state, and local government representatives and agencies; elected officials; regional environmental and non-governmental organizations; Indian tribes; affected landowners; newspapers and libraries in the project area; other interested individuals and groups; and parties to the proceedings. Paper copies of this EIS were mailed to those specifically requesting them; all others on our environmental mail list received a compact disk version. In addition, the draft EIS is available for public viewing on the FERC's website (www.ferc.gov) using the eLibrary link. A limited number of hard copies are available for distribution and public inspection at:

[1] A "pig" is a tool for cleaning and inspecting the inside of a pipeline.

Federal Energy Regulatory Commission
Public Reference Room
888 First Street N.E., Room 2A
Washington, DC 20426
(202) 502-8371

Any person wishing to comment on the draft EIS may do so. To ensure consideration of your comments on the proposal in the final EIS, it is important that the Commission receive your comments on or before **February 13, 2015**.

For your convenience, there are four methods you can use to submit your comments to the Commission. In all instances, please reference the project docket number (e.g., CP13-483-000) with your submission. The Commission encourages electronic filing of comments and has expert staff available to assist you at (202) 502-8258 or efiling@ferc.gov.

1) You can file your comments electronically using the eComment feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. This is an easy method for submitting brief, text-only comments on a project;

2) You can file your comments electronically by using the eFiling feature on the Commission's website (www.ferc.gov) under the link to Documents and Filings. With eFiling, you can provide comments in a variety of formats by attaching them as a file with your submission. New eFiling users must first create an account by clicking on "eRegister." If you are filing a comment on a particular project, please select "Comment on a Filing" as the filing type; or

3) You can file a paper copy of your comments by mailing them to the following address:

   Kimberly D. Bose, Secretary
   Federal Energy Regulatory Commission
   888 First Street NE, Room 1A
   Washington, DC 20426

4) In lieu of sending written or electronic comments, the Commission invites you to attend one of the public comment meetings its staff will conduct in the project area to receive comments on the draft EIS. We encourage interested groups and individuals to attend and present oral comments on the draft EIS. Transcripts of the meetings will be available for review in eLibrary under the Project docket number. **All meetings will begin at 6 p.m. and are scheduled as follows**:

Date	**Location**
Monday, December 8, 2014	Southwestern Oregon Community College Hales Performing Arts Center 1988 Newmark Avenue Coos Bay, OR 97420
Tuesday, December 9, 2014	Umpqua Community College Lang Center 1140 Umpqua College Road Roseburg, OR 97470
Wednesday, December 10, 2014	Seven Feathers Casino-Hotel & Conference Center 146 Chief Miwaleta Lane Canyonville, OR 97417
Thursday, December 11, 2014	Central Medford High School 815 S. Oakdale Avenue Medford, OR 97501
Friday, December 12, 2014	Oregon Institute of Technology College Union Auditorium 3201 Campus Drive Klamath Falls, OR 97601
Saturday, December 13, 2014	Malin Community Hall 2307 Front Street Malin, OR 97632

Any person seeking to become a party to the proceeding must file a motion to intervene pursuant to Rule 214 of the Commission's Rules of Practice and Procedures (18 Code of Federal Regulations Part 385.214).[2] Only intervenors have the right to seek rehearing of the Commission's decision. The Commission grants affected landowners and others with environmental concerns intervenor status upon showing good cause by stating that they have a clear and direct interest in this proceeding which no other party can adequately represent. **Simply filing environmental comments will not give you intervenor status, but you do not need intervenor status to have your comments considered.**

Additional information about the Project is available from the Commission's Office of External Affairs, at **(866) 208-FERC,** or on the FERC (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP13-483). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FercOnline Support@ferc.gov or toll free at (866) 208-3676; for TTY, contact (202) 502-8659. The eLibrary link also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

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[2] See the previous discussion on the methods for filing comments.

In addition, the Commission offers a free service called eSubscription that allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. Go to www.ferc.gov/docs-filing/esubscription.asp.

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APPENDICES

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AADT	average annual daily traffic
AAQS	ambient air quality standards
AASHTO	American Association of State Highway Transportation Officials
ACDP	air contaminant discharge permit
ACEC	Area of Critical Environmental Concern
ACFM	actual cubic feet per minute
ACHP	Advisory Council on Historic Preservation
ACS	Aquatic Conservation Strategy
AEGL	Acute Exposure Guideline Level
AGPA	Alaska Gasline Port Authority
AIA	annual instrument approach
AIRFA	American Indian Religious Freedom Act
AIS	Automatic Information System
ANFO	Ammonium Nitrate and Fuel Oil
ANS	aquatic nuisance species
ANSI	American National Standards Institute
AOC	area of concern
APDBA	applicant prepared draft biological assessment
APE	area of potential effect
API	American Petroleum Institute
Applicants	Jordan Cove Energy and Pacific Connector
AQCR	Air Quality Control Region
AQRV	Air Quality-Related Values
ASCE	American Society of Civil Engineers
ASL	above sea level
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATON	aids to navigation
ATV	all-terrain vehicle
Avista	Avista Corporation
BA	biological assessment
BACT	Best Available Control Technology
BBS	Breeding Bird Survey
BC	British Columbia
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BE	Biological Evaluation
BFM	bonded fiber mix
bgs	below ground surface
BIA	U.S. Bureau of Indian Affairs
BLEVE	boiling-liquid-expanding-vapor explosion
BLM	U.S. Department of the Interior Bureau of Land Management
BMP	best management practice
BO	biological opinion

BOEM	Bureau of Ocean Energy Management
BOG	boil-off gas
BPA	Bonneville Power Administration
BRAR13	2013 Blue Ridge Alternative Route
Bscf	billion standard cubic feet
Bscf/d	billion standard cubic feet per day
Btu	British thermal units
Btu/ft-hr-°F	British thermal units per foot per hour per degrees Fahrenheit
Btu/ft^2-hr	British thermal units per square foot per hour
Btu/lb-°F	British thermal units per pound per degrees Fahrenheit
Btu/kWh	British thermal units per kilowatt hour
BVA	block valve
BWT	ballast water treatment
BWE	ballast water exchange
Byram	Byram Archaeological Consulting LLC
C-2	C-2 Cattle Company
CAA	Clean Air Act
CadnaA	computer aided noise abatement
CAL	Citizens Against LNG
CBC	Christmas Bird Count
CBEMP	Coos Bay Estuary Management Plan
CBNBWB	Coos Bay-North Bend Water Board
CBR	Coos Bay Rail Link
CCS	carbon capture and storage
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFD	computational fluid dynamics
CFR	Code of Federal Regulations
CH_4	methane
CHE	Coast and Harbor Engineering
CHU	critical habitat unit
CMP	Compensatory Mitigation Plan
CMZ	Channel Migration Zone
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Coast Guard	U.S. Department of Homeland Security Coast Guard
COC	Corridor of Concern
COE	U.S. Army Corps of Engineers
COI	Certificate of Inspection
Commission	Federal Energy Regulatory Commission
Coos Tribes	Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
COTP	Captain of the Port
Cow Creek Tribe	Cow Creek Band of Umpqua Tribe of Indians
CP	cathodic protection
CPR	cardio-pulmonary resuscitation
CRITFC	Columbia River Inter-Tribal Fish Commission
CSZ	Cascadia Subduction Zone
CTG	combustion turbine generators
CWA	Clean Water Act

CWD	coarse wood
cy	cubic yard
CZMA	Coastal Zone Management Act
DA	Development Aquatic
dB	decibel
dBA	A-weighted decibels
dBC	C-weight decibels
dbh	diameter at breast height
dB RMS	decibels root mean squared
DBV/PERC	double ball valve and powered emergency release coupling
DC	direct current
DCS	distributed control system
DE	Design Earthquake
DEA	David Evans & Associates, Inc.
DEGADIS	dense gas dispersion model
DEIS	draft environmental impact statement
Discovery Plan	*Plan and Procedures Addressing Unanticipated Discoveries of Cultural Resources and Human Remains*
DMEF	Dredged Material Evaluation Framework
DMMU	Dredged Material Management Unit
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOGAMI	Oregon Department of Geology and Mineral Industries
DOT	U.S. Department of Transportation
DP	Direct Pipe
DPS	Distinct Population Segments
DTR	daily timing restriction
DWSA	drinking water source area
ECA	Emissions Control Area
ECRP	Pacific Connector's Erosion Control and Revegetation Plan
ECSI	Environmental Cleanup Site Information
EEZ	economic exclusion zone
EFH	essential fish habitat
EFSC	Oregon Energy Facility Siting Council
EFU	Exclusive Farm Use
EI	environmental inspector
EIA	Energy Information Administration
EIS	environmental impact statement
EMD	electric motor driven
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
EPCM	Engineering, Procurement, and Construction Management
ERP	emergency response plan
ERPG	Emergency Response Planning Guidelines
ESA	Endangered Species Act
ESCP	Erosion and Sedimentation Control Plan
ESD	emergency shutdown
ESU	Evolutionarily Significant Units
EWMP	Estuarine Wetland/Open Water Mitigation Plan
F	Forest

FAA	Federal Aviation Administration
FDS	Fire Dynamics Simulator
FEED	front-end engineering design
FEIS	final environmental impact statement
FEMAT	Forest Ecosystem Management Assessment Team
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FLPMA	Federal Land and Policy Management Act of 1976
FMSC	Federal Maritime Security Council
FOI	Forest Operations Inventory
Forest Service	U.S. Department of Agriculture Forest Service
fps	foot per second
FR	Federal Register
FSH	Forest Service Handbook
FSM	Forest Service Manual
ft^3	cubic feet
FTA	free trade agreement
FTE	full-time equivalent
FWCA	Fish and Wildlife Coordination Act
FWS	U.S. Department of the Interior Fish and Wildlife Service
FY	Fiscal Year
g/hp-hr	grams per horsepower per hour
GDP	Gross Domestic Product
GHG	greenhouse gas
GIS	geographic information system
GNN	Gradient Nearest Neighbor
gpm	gallons per minute
GPS	global positioning system
Grand Ronde Tribes	Confederated Tribes of the Grand Ronde Reservation
GRI	GRI Geotechnical and Environmental Consultants
GTN	Gas Transmission Northwest Corporation
GWP	global warming potential
H	horizontal
H_2S	hydrogen sulfide
HAP	Hazardous Air Pollutant
HAZOP	hazard and operability review
HBC	Hudson Bay Company
HCA	High Consequence Area
HDD	horizontal directional drill
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HMU	Herd Management Unit
HOA	Head of Agreement
hp	horsepower
HPMP	Historic Properties Management Plan
HPS	high pressure sodium
HRA	Historical Research Associates, Inc.
HRSG	heat recovery steam generator
HU	hydrologic unit
HUC	Hydrologic Unit Code
Hz	hertz
I-5	Interstate 5

IBC	International Building Code
IHA	Incidental Harassment Authorization
IMO	International Maritime Organization
IOP	Interagency Operating Procedure
IPCC	Intergovernmental Panel on Climate Change
IRA	Inventories Roadless Area
ISA	International Society for Automation
ISO	International Organization for Standardization
ISPS Code	International Ship and Port Facility Security Code
JCE & PCGP	Jordan Cove Energy and Pacific Connector Gas Pipeline Project
Jordan Cove	Jordan Cove Energy Project L.P.
Jordan Cove's Plan	Jordan Cove's Upland Erosion Control, Revegetation, and Maintenance Plan
Jordan Cove's Procedures	Jordan Cove's Wetland and Waterbody Construction and Mitigation Procedures
JPA	Joint Permit Application
KBV	Kiewitt and Black & Veatch
kJ	kilojoules
KO	Knockout
KOAC	Known Owl Activity Center
km	kilometer
KOP	key observation point
kPa	kilopascals
kV	kilovolt
kVa	kilovolt amperes
kW	kilowatt
kWh	kilowatt-hour
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
Latgawa Tribe	Latgawa Native American Indian Tribe
lb/MWh	pound per megawatt-hour
LDC	local distribution company
LEDPA	Least Environmentally Damaging Practicable Alternative
Levy	Lloyd Levy Consulting, LLC
LFL	lower flammable limit
LiDAR	light detection and ranging
LMP	land management plan
LNG	liquefied natural gas
LOI	Letter of Intent
LOR	Letter of Recommendation
LRMP	Land and Resource Management Plan
LSOG	late-successional and old-growth
LSR	Late Successional Reserve
LSRA	Late Successional Reserve Assessment
LSRMA	Late-Successional Reserve Management Area
LUCS	Land Use Compatibility Statement
LWD	large woody debris
m/sec	meters per second
m^2	square meter
m^3	cubic meters
m^3/hr	cubic meters per hour

m/hr	meter per hour
MA	Management Area
MAMU	marbled murrelet
MAOP	maximum allowable operating pressure
MARSEC	Maritime Security
MBF	thousand board feet
MBTA	Migratory Bird Treaty Act
MCE	Maximum Considered Earthquake
mcy	million cubic yards
mg/l	milligram per liter
mg/d	million gallons per day
mg/kg	milligram per kilogram
MHHW	mean higher high water
MIS	Management Indicator Species
MLLW	mean lower low water
MLRA	Major Land Resource Area
MLV	mainline block valve
mm	millimeter
MMBF	million board feet
MMBtu	million British thermal unit
MMBtu/hr	million British thermal units per hour
MMcf/d	million cubic feet per day
mmhos/cm	millimhos per centimeter
MMPA	Marine Mammal Protection Act
MMTPA	million metric tons per annum
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MP	milepost
mph	miles per hour
MPRSA	Marine Protection, Research, and Sanctuary Act
MR	Mixed Refrigerant
MRL	Mixed Refrigerant liquid
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	mean sea level
MTBM	micro-tunnel boring machine
MTSA	Maritime Transportation Security Act
MVA	megavolt ampere
Mw	maximum moment magnitude
MW	megawatt
MWh	megawatt-hour
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAISA	National Aquatic Invasive Species Act of 2003
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
NAS	Non-indigenous aquatic species
NAVD88	North American Vertical Datum of 1988
NCA	National Climate Assessment
NCDC	National Climactic Data Center
NCM	Navigation channel mile
NEB	National Energy Board

NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NF	National Forest
NFMA	National Forest Management Act
NFPA	National Fire Protection Association
NFS	National Forest System
NGA	Natural Gas Act
NGL	natural gas liquids
NHPA	National Historic Preservation Act
NISA	National Invasive Species Act of 1996
NMFS	National Oceanic and Atmospheric Administration National Marine Fisheries Service
nmi	nautical mile
NNL	National Natural Landmark
NNSR	Nonattainment New Source Review
NO	nitrogen oxide
NO_2	nitrogen dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
Northwest	Northwest Pipeline GP
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NPWHPC	North Point Workforce Housing Complex
NRA	National Recreation Area
NRCS	Natural Resources Conservation Service
NRF	nesting, roosting, and foraging
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NSO	northern spotted owl
NSPS	New Source Performance Standards
NSR	New Source Review
NTU	nephelometric turbidity unit
NVIC	Navigation and Vessel Inspection Circular
NWFP	Northwest Forest Plan
NWI	National Wetlands Inventory
NWS	National Weather Service
O_2	oxygen
O&C Act	Oregon and California Lands Act
O&C Lands	Oregon and California Lands
OAR	Oregon Administrative Record
OBE	Operating Basis Earthquake
OCIMF	Oil Companies International Marine Forum
OCMP	Oregon Coastal Management Program
OCRM	National Oceanic and Atmospheric Administration Office of Coast and Ocean Resource Management
ODA	Oregon Department of Agriculture
ODE	Oregon Department of Energy
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry

ODFW	Oregon Department of Fish and Wildlife
ODHS	Oregon Department of Human Services
ODLCD	Oregon Department of Land Conservation and Development
ODNRA	Oregon Dunes National Recreation Area
ODOT	Oregon Department of Transportation
ODSL	Oregon Department of State Lands
OEP	FERC's Office of Energy Projects
OHWM	ordinary high water mark
OHV	Off-Highway Vehicle
OHWM	ordinary high water mark
OIMB	Oregon Institute of Marine Biology
OPRD	Oregon Parks and Recreation Department
OPS	Office of Pipeline Safety
OPT	Ocean Power Technologies
ORBIC	Oregon Biodiversity Information Center
Oregon GAP	Oregon Gap Analysis Project
Oregon LNG	LNG Development Company LLC and the Oregon Pipeline Company
ORS	Oregon Revised Statute
OSHA	Occupational Safety and Health Administration
OSMB	Oregon State Marine Board
OSMRE	Office of Surface Mining Reclamation Enforcement
OSWB	Oregon State Weed Board
OWRD	Oregon Water Resources Department
Pacific Connector	Pacific Connector Gas Pipeline L.P.
PAG	plant association group
PAH	polynuclear aromatic hydrocarbon
PAR	permanent access road
PCB	polychlorinated biphenyl
PCE	primary constituent element
PCS	Project Consulting Services, Inc.
PCT	Pacific Crest Trail
PCTA	Pacific Crest Trail Association
PES	PES Environmental, Inc.
PFMC	Pacific Fishery Management Council
PFYC	Potential Fossil Yield Classification
PG&E	Pacific Gas and Electric Company
PGA	peak horizontal ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PI	point of intersection
PILT	Payment In Lieu of Taxes
P.L.	Public Law
Plan	FERC's Upland Erosion Control, Revegetation, and Maintenance Plan
PM_{10}	particulate matter with a diameter of less than 10 microns
$PM_{2.5}$	particulate matter with a diameter of less than 2.5 microns
POD	Plan of Development
Port	Oregon International Port of Coos Bay
PORTS	Physical Oceanographic Real-Time System
PP&L	Pacific Power and Light Company
ppm	parts per million

ppmvd	parts per million by volume, dry basis
PPV	peak particle velocity
Procedures	FERC's Wetland and Waterbody Construction and Mitigation Procedures
Project	Jordan Cove Energy and Pacific Connector Gas Pipeline Project
PSD	Prevention of Significant Deterioration
PSE	Puget Sound Energy
PSEL	plant site emission limit
PSHA	Probabilistic Seismic Hazard Analysis
psi	pounds per square inch
psig	pounds per square inch gauge
PST	Pacific Standard Time
psu	practical salinity unit
PWA	potential wilderness area
R.	Range
R&A	Rogers and Associates
RBC	Risk-Based Concentration
Reclamation	U.S. Department of the Interior Bureau of Reclamation
REO	Regional Ecosystem Office
RFPD	Rural Fire Protection District
RHA	Rivers and Harbors Act
RM	river mile
RML	rapidly moving landslide
RMP	Resource Management Plan
RNA	Research Natural Area
RPT	rapid phase transition
ROD	Record of Decision
RPT	rapid phase transition
RV	recreational vehicle
S&M	Survey and Manage
Sandia	Sandia National Laboratories
SAP	sampling and analysis plan
SAV	submerged aquatic vegetation
SBS	Siskiyou BioSurvey, LLC
SD	scaled distance factor
SDWA	Safe Drinking Water Act
SEP	surface emissive power
SEV	severity of ill effect
SHN	SHN Consulting Engineers & Geologists, Inc.
SHPO	State Historic Preservation Officer
SHU	Suitable Habitat Unit
SIGTTO	Society of International Gas Tanker and Terminal Operators
Siletz Tribes	Confederated Tribes of the Siletz Reservation
SMPE	South Mist Pipeline Extension
SMS	Scenery Management System
SMU	Species Management Unit
SO_2	sulfur dioxide
SOLAS	Safety of Life at Sea
SONCC	Southern Oregon/Northern California Coast
SORSC	Southwest Oregon Regional Safety Center
SPCCP	Spill Prevention, Containment, and Countermeasures Plan

SRMA	Special Recreation Management Area
SSA	sole or principal source aquifer
SSE	Safe Shutdown Earthquake
SSI	Sensitive Security Information
SSTEMP	Stream Segment Temperature Model
SSURGO	Soil Survey Geographic (Database)
STATSGO	State Soil Geographic (Database)
STEP	Shipboard Technology Evaluation Program
STG	steam turbine generator
SWPCP	Storm Water Pollution Control Plan
SWPPP	Stormwater Pollution Prevention Plan
t	metric ton
T.	Township
TAR	temporary access road
TCP	Traditional Cultural Property
Tetra Tech	Tetra Tech, Inc.
TEWA	temporary extra work area
t/hr	metric ton per hour
THPO	Tribal Historic Preservation Office
TMDL	Total Maximum Daily Load
TMP	Transportation Management Plan
TPY	tons per year
TR	Timberland Resource
TSS	total suspended solids
Tuscarora	Tuscarora Gas Transmission Company
TVS	total volatile solids
U.S.	United States
UCSA	uncleared storage area
UFL	upper flammable limit
UPS	uninterruptible power supply
U.S.C.	United States Code
USDOI	U.S. Department of the Interior
USGCRP	United States Global Change Research Program
USGS	U.S. Geological Survey
V	vertical
V_s	shear velocity
v/c	volume-to-capacity ratio
VMS	Visual Management System
VOC	volatile organic compound
VQO	Visual Quality Objective
VRM	visual resource management
WD	Water-Dependent Development Shorelands
WEP	Washington Expansion Project
WHPA	wellhead protection area
Williams Northwest	Williams Northwest Pipeline Company
Williams Pacific Operator	Williams Pacific Connector Gas Operator, LLC
Williams	Williams Companies Inc.
WNV	West Nile virus
WQC	401 Water Quality Certification
WRCC	Western Regional Climatic Center
WRP	Wetland Reserve Program

WSA	Waterway Suitability Assessment
WSR	Waterway Suitability Report

EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

On May 21, 2013, Jordan Cove Energy Project, L.P. (Jordan Cove) filed an application with the Federal Energy Regulatory Commission (FERC or Commission) in Docket No. CP13-483-000, under section 3 of the Natural Gas Act (NGA), seeking authority to construct and operate a new liquefied natural gas (LNG) export terminal at Coos Bay, Oregon. The terminal would have the capacity to produce up to 6 million metric tons per annum (MMTPA) of LNG for shipment to customers around the Pacific Rim. Pacific Connector Gas Pipeline, LP (Pacific Connector) filed its companion application with the FERC on June 6, 2013, in Docket No. CP13-492-00, under section 7 of the NGA, seeking authority to construct and operate a new 232-mile-long, 36-inch-diameter transmission pipeline capable of transporting up to 1 billion cubic feet of natural gas per day (Bcf/d) from the Malin, Oregon hub to the Jordan Cove terminal. Pacific Connector would obtain natural gas from western Canadian and Rocky Mountain sources, through interconnections with the existing systems of Ruby Pipeline LLC (Ruby) and Gas Transmission Northwest LLC (GTN); and would also serve markets in southern Oregon through an interconnection with the existing Northwest Pipeline GP's (Northwest) Grants Pass Lateral. Hereafter, we[1] refer to these inter-related proposals collectively as the Jordan Cove Energy and Pacific Connector Gas Pipeline (JCE & PCGP) Project, or the Project.

The Commission would not make its decision about whether to authorize the Project until after it has considered the environmental impacts associated with the construction and operation of the proposed facilities, in accordance with the National Environmental Policy Act (NEPA), and other non-environmental economic factors such as markets and rates. This draft environmental impact statement (EIS) was produced by the FERC staff and other federal cooperating agencies to meet the guidelines outlined by the Council of Environmental Quality (CEQ) in their regulations implementing the NEPA at Title 40 Code of Federal Regulations (CFR) Parts 1500-1508, and the Commission's regulations at 18 CFR 380. The purpose of this document is to inform the Commission, other permitting agencies, and the public about the potential adverse and beneficial environmental impacts of the Project and its alternatives, and to recommend measures that would avoid, reduce, or mitigate any significant adverse impacts to the extent practicable. We prepared this analysis based on information provided by Jordan Cove and Pacific Connector, independent research, and comments from federal, state, and local agencies, and the public.

The FERC is the federal agency responsible for authorizing onshore LNG terminals and interstate natural gas transmission facilities, as specified in section 311(e)(1) of the Energy Policy Act of 2005 (EPAct) and the NGA. In accordance with section 313(b)(1) of the EPAct, the FERC is the lead federal agency for the coordination of all applicable federal authorizations, and is also the lead federal agency for preparation of this EIS.

The United States (U.S.) Department of Agriculture Forest Service (Forest Service); U.S. Army Corps of Engineers (COE); U.S. Department of Energy; U.S. Environmental Protection Agency (EPA); U.S. Department of Homeland Security Coast Guard (Coast Guard); U.S. Department of

[1] The pronouns "we," "us," or "our" are used to reference the environmental staff of the FERC's Office of Energy Projects (OEP).

the Interior Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation), and Fish and Wildlife Service (FWS); and the Pipeline and Hazardous Materials Safety Administration (PHMSA) within the U.S. Department of Transportation (DOT) are cooperating agencies, as defined in 40 CFR 1501.6, for the development of this EIS. A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposal, and can participate in the NEPA analysis.

For the BLM and Forest Service, the primary purpose of this EIS is to consider and disclose the environmental consequences of construction and operation of the Pacific Connector pipeline on BLM and National Forest System (NFS) lands and to evaluate proposed land management plan (LMP) amendments. The BLM would need specific amendments to its LMPs for the Coos Bay, Roseburg, and Medford Districts, while the Forest Service would need to amend LMPs for the Umpqua, Rogue River, and Winema National Forests to account for some Project activities. The BLM would also utilize this EIS when it considers Pacific Connector's Right-of-Way Grant application submitted on April 17, 2006, and amended on February 26, 2013, to allow for a right-of-way easement across federal lands in accordance with the Mineral Leasing Act, with concurrence from the Forest Service and Reclamation.

PROPOSED ACTION

The purpose of the Project is to create a new West Coast LNG export point to mainly serve Asian customers, and potentially markets in Alaska and Hawaii. Pacific Connector would provide natural gas produced in western Canada and the Rocky Mountains to the Jordan Cove terminal. Jordan Cove's proposal would include vessel transit using a waterway to and from the export terminal; an access channel between the existing Coos Bay navigation channel and the terminal marine slip; the slip, tug boat berth, and LNG vessel berth and loading platform; transfer pipeline; two LNG storage tanks; four liquefaction trains and refrigerant storage bullets; fire water ponds; ground flares; 420-megawatt South Dunes Power Plant; support buildings; utility and access corridor between the terminal and the power plant; Southwest Oregon Resource Security Center; and the natural gas treatment plant.

The Pacific Connector proposal would consist of a 232-mile-long, 36-inch-diameter underground welded steel pipeline between Malin and Coos Bay; the 41,000 horsepower Klamath Compressor Station; the Klamath-Eagle Receipt Meter Station and Klamath-Beaver Receipt Meter Station within the compressor station tract; Clarks Branch Delivery Meter Station at the interconnection with Northwest; the Jordan Cove Delivery Meter Station at the interconnection with the Jordan Cove LNG terminal; 5 pig[2] launchers and receivers; 17 mainline block valves; and 11 communication towers co-located with other facilities.

PUBLIC INVOLVEMENT

We began our environmental review of the Project in May and June of 2012, after approving separate requests from Jordan Cove and Pacific Connector to initiate our Pre-filing review process in Docket Nos. PF12-7-000 and PF12-17-000, respectively. On August 2, 2012, the FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Jordan Cove Liquefaction and Pacific Connector Pipeline Projects, Requests for Comments on Environmental Issues, and Notice of Public Scoping Meetings* (NOI). We sent the NOI to

[2] A "pig" is a tool for cleaning and inspecting the inside of a pipeline.

elected federal, state, and local government officials; agency representatives; regional environmental and non-governmental organizations (NGO); Indian tribes; affected landowners; and local libraries and newspapers. The NOI encouraged stakeholders to provide comments during a scoping period that lasted until October 29, 2012. Seven public meetings were held jointly with the BLM and Forest Service during the scoping period in Coos Bay (August 27, 2012), Roseburg (August 28, 2012), Klamath Falls (August 29, 2012), Medford (August 30, 2012), North Bend (October 9, 2012), Canyonville (October 10, 2012), and Malin (October 11, 2012). Transcripts of comments from the public scoping meeting were placed into the public record of these proceedings. In addition, between August 3, 2012 (after the NOI was issued) and October 29, 2012 (the end of the announced scoping period), the FERC received 130 letters from individuals, 26 letters from NGOs, 5 letters from federal agencies, 4 letters from state and local agencies, and 2 letters from members of the U.S. Congress. In addition, 429 form letters were filed. Between October 30, 2012, and September 30, 2014 (when much of the text for this draft EIS was written), the FERC received an additional 26 comment letters. All comments received prior to the writing of this draft EIS were considered, and we addressed all relevant environmental topics included in the analysis.

After publication of this draft EIS, the public will have a 90-day period to comment on the document. In addition, the FERC, BLM, and Forest Service will hold public meetings to take comments on the draft EIS at various locations in southern Oregon.

ALTERNATIVES CONSIDERED

Alternatives considered in this EIS include the no action alternative, system alternatives, LNG terminal alternatives, pipeline route alternatives, and aboveground facilities alternatives. While denying Project approval would avoid the environmental impacts identified in this EIS, the objectives of the Project would not be met.

We considered the possibility of using existing jurisdictional interstate pipeline systems, including those operated by Northwest, Ruby, and GTN, as potential system alternatives to the Pacific Connector pipeline. We also considered one non-jurisdictional intrastate route, the existing Coos County Pipeline. These system alternatives were rejected as impracticable or infeasible because either the existing pipeline routes do not connect Malin with Coos Bay, or the existing systems would be not be able to handle the additional volumes of natural gas required to be transported by Pacific Connector.

We do not consider any of the proposed LNG export terminals on the Gulf Coast or East Coast of the United States to be reasonable or practicable alternatives to the Jordan Cove proposal, because they would not meet one of the main objectives of the Project (to establish an LNG export point on the West Coast). LNG vessels taking cargo from Gulf Coast or East Coast terminals would have substantially longer and less direct routes to Asian markets than from the West Coast. Furthermore, Jordan Cove proposes to acquire its natural gas from western Canadian and Rocky Mountain sources, while proposed East Coast export terminals would likely receive natural gas from the Appalachian Basin, and Gulf Coast terminals would likely receive natural gas from sources in Louisiana and Texas.

We acknowledge that there are existing LNG terminals in Mexico and Alaska. The terminals in Mexico are designed to import LNG, and we are unaware of plans to convert them for export. The existing LNG export terminal at Kenai, Alaska, does not have supplies or volume capacity to meet the goals of the Jordan Cove terminal. We also considered if it was possible to convert any of the existing LNG storage facilities (peak shaving plants) in the Pacific Northwest to LNG export terminals, but found they did not have adequate ports for LNG vessel access.

There are other proposals to construct and operate new LNG export terminals in British Columbia, Canada, Alaska, and in Warrenton, Oregon. In the case of the proposed British Columbia terminals, their permitting status appears uncertain and they may not be ready for construction within the same time frame as the Jordan Cove terminal. The two new proposals for LNG export terminals in Alaska would not be able to access natural gas supplies in western Canada and the Rocky Mountains, thus not meeting one of the main objectives of the Project. In the case of the proposed Oregon LNG terminal near Warrenton, the FERC has not yet completed its environmental review. We were unable to identify any other alternative port location on the Pacific Coast of the United States for an LNG export terminal that could meet the objectives of the Jordan Cove Project and that would have significant environmental advantages over Coos Bay.

We considered alternative designs for Jordan Cove's facilities at Coos Bay, including a smaller marine slip, and underground, lower, wider LNG storage tanks. A smaller slip would be impracticable given Jordan Cove's multi-user concept, which would require enough space for three berths, including one for LNG vessels, one for tugs and escort boats, and a potential future west side berth for other commercial ships, assuming the Oregon International Port of Coos Bay (Port) follows through on its plans to provide for large deep-draft container ships. Buried, wider, lower LNG storage tanks would be infeasible, given Jordan Cove's need for a certain amount of LNG storage for commercial viability, low groundwater, and configuration within the Ingram Yard to include the LNG vapor exclusion area.

We examined multiple pipeline route alternatives in detail. In all cases, we concluded that each alternative route did not offer significant environmental advantages over the equivalent segment of the proposed route. We also assessed alternative locations for Pacific Connector's aboveground facilities, including two alternative sites for the Klamath Compressor Station, and found the proposed sites to be environmentally preferable.

PROJECT IMPACTS AND MITIGATION

We evaluated the impacts of the Project on a range of environmental resources, including land use, geology, soils, waterbodies and wetlands, vegetation, wildlife, fisheries, special status species, recreation and visual resources, socioeconomics, cultural resources, air quality, noise, and safety. We also considered the cumulative impacts of the Project incrementally with other actions that may occur in a similar time frame within the same watersheds crossed by the proposed pipeline route.

Land Use

The upland facilities for the Jordan Cove terminal would be on privately owned lands; zoned for industrial and water dependent use. In total, construction of the terminal facilities would affect 32 acres of open water, 63 acres of open land, 67 acres of forest, and 33 acres of industrial land. No residences are located within 1 mile of the terminal. On August 1, 2014, Jordan Cove and Pacific Connector submitted their application with the Oregon Coastal Management Program of the Department of Land Conservation and Development (ODLCD) for certification of consistency with the Coastal Zone Management Act (CZMA). Jordan Cove and Pacific Connector obtained necessary conditional use permits and land use compatibility statements from the affected counties. The Pacific Connector pipeline route would cross 157.3 miles of private lands and 74.5 miles of public lands. About 64 percent of the route would cross forest, 17 percent would be agricultural land, 10 percent would be range, and 7 percent would be urban or built-up lands. The pipeline construction right-of-way would be within 50 feet of seven residences, and Pacific Connector has filed site-specific residential construction plans to reduce impacts.

Of the public lands crossed, about 40 miles would be administered by the BLM, and 31 miles would be NFS lands. The pipeline would also cross about 0.7 mile of Reclamation land and 26 irrigation features managed by Reclamation's Klamath Project. The Pacific Connector pipeline route would cross certain land allocations defined by the Northwest Forest Plan on federal lands, including 23.6 miles of Late Successional Reserves (LSR), 2.9 miles of unmapped LSRs, 43.4 miles of Matrix, and 5.1 miles of Riparian Reserves. The EIS discusses two site-specific LMP amendments for the BLM's Coos Bay District; three site-specific plan amendments for the BLM's Roseburg District; four site-specific plan amendments for the Umpqua National Forest; six site-specific plan amendments for the Rogue National Forest; five site-specific plan amendments for the Winema National Forest; and one general amendment that applies to all BLM and NFS lands crossed by the proposed pipeline route.

Storm Surge, Geology, and Soils

The LNG terminal is within the active Cascadia Subduction Zone (CSZ). A tsunami generated by a potential future megathrust earthquake on the CSZ would present inundation risks at the site. Models for this location up to a 2,475-year return period event predict a tsunami peak run-up elevation of about +33 feet. Therefore, to protect its facilities from a potential future tsunami, Jordan Cove would raise the elevation of its LNG terminal processing area to +46 feet, and would surround the LNG storage tanks with a storm surge barrier about 60 feet high.

Earthquakes can result in ground subsidence, lateral spreading, and soil liquefaction. Modeling for the Jordan Cove LNG terminal location indicated that the maximum subsidence for the most likely earthquake scenario considered is approximately 8 feet. The majority of the sandy soils encountered below the fill at the LNG terminal site are dense enough to resist liquefaction during design-level earthquakes. To mitigate for the risk of liquefaction, Jordan Cove would implement a series of ground improvement methods such as vibroflotation, jet grouting, stone columns, compaction grouting, and deep dynamic compaction, as necessary. Based on the distance of the LNG storage tanks to the edge of the flat slopes, and the limited extent of liquefiable soils, the risk of lateral spreading is low. We are recommending that Jordan Cove provide final seismic design data before the Commission allows any construction of the terminal.

We identified five Quaternary and Holocene age fault zones that would be crossed by the pipeline route between mileposts (MP) 172 and 213 within the Klamath Basin. Pacific Connector indicated it would check the trench for evidence of stratigraphic offsets potentially related to ground rupture. If such features are observed, Pacific Connector would implement additional mitigation measures at these locations, including burying the pipe in a wider trench backfilled with loose gravel or sand. High liquefaction and/or lateral spreading potential were identified at seven sites (Haynes Inlet, Kentuck Inlet, Willanch Slough, Coos River, Willis Creek, Rogue River, and Klamath Valley/Klamath River) along the pipeline route. Pacific

Connector would conduct numerical modeling for these sites prior to construction to estimate the magnitude of liquefaction-induced settlement and lateral spreading that would be expected during the design earthquake event. If the numerical modeling indicates that liquefaction settlement and/or lateral spreading would result in excessive pipe stress conditions, further mitigation design would be needed. Mitigation options may include deeper burial below the liquefiable soils, thicker pipe, and/or weighting the pipe with a concrete coating, if necessary.

Pacific Connector selected its pipeline route to avoid areas with high risk of geological hazards such as landslides. The route would cross two known moderate-risk rapidly moving landslide sites (at MP 18.1 and MP 36.9). However, the risks to the pipeline at these sites are not considered hazardous enough to require additional mitigation or rerouting.

The pipeline alignment would be within 500 feet of potential mine hazards at 23 locations, 16 of which are aggregate mines or quarries. The route between MPs 108.6 and 110.9 avoids the Peavine Quarry within the Umpqua National Forest. The alignment at MP 150.5 is within approximately 100 feet northeast of the Heppsie Mountain quarry on BLM land. Between MPs 108.6 and 109.4, the pipeline would be within 200 feet of three historic mercury mines, but would not cross any adits or workings.

The portion of Coos Bay that would be dredged to create the access channel to the Jordan Cove terminal marine slip does not contain any contaminated sediments. Testing at the former Weyerhaeuser mill site indicated that concentrations of contaminates are below screening levels that would represent a risk to public health. The Oregon Department of Environmental Quality (ODEQ) recommended "No Further Action" at this location, and approved a closure plan. Jordan Cove would cover the former mill site with clean sediments from the marine slip and access channel to raise the elevation for the planned South Dunes Power Plant and associated facilities.

No known contaminated sites would be crossed by the route for Pacific Connector's pipeline. Pacific Connector developed a *Contaminated Substances Discovery Plan* that specifies the measures that would be implemented if unanticipated contaminated soils are encountered.

Within the Jordan Cove terminal area, 56 acres of Heceta Fine Sand and 45 acres of Dune Land soils both have a slight potential for water erosion and high to severe potential for wind erosion. Jordan Cove would reduce the potential for soil erosion by following the measures of the FERC's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and its own *Erosion and Sediment Control Plan*.

The Pacific Connector pipeline route would cross about 93.4 miles of soils with a high or severe water erosion potential, and 14.7 miles of very fine to coarse sand to silt loam soils that are highly susceptible to wind erosion. The pipeline alignment would cross approximately 72 miles of soils classified as prime farmland or farmland of statewide importance. Crops are not grown on all of these soils. None of Pacific Connector's aboveground facilities would be located on prime farmland; so no prime farmland would be taken out of production. Potential impacts on soils would be minimized through measures specified in Pacific Connector's *Erosion Control and Revegetation Plan* (ECRP).

Water and Wetlands

There are no EPA-designated sole source aquifers near the Project. There are four existing groundwater wells within the Roseburg Forest Products tract near temporary extra workspace areas to be used by Jordan Cove; however, terminal construction activities should not affect these wells. Jordan Cove estimates that it would need a total of approximately 1.7 billion gallons of water for construction and 1.3 million gallons of water per day during operation of the terminal facilities. Water requirements for the LNG terminal would be supplied by the Coos Bay North Bend Water Board (CBNBWB). The CBNBWB has 18 groundwater wells located within the Oregon Dunes National Recreation Area (ODNRA) to the north of the LNG terminal; however, the closest is about 3,500 feet away. To prevent or reduce impacts on groundwater from the accidental release of hazardous materials, Jordan Cove prepared a preliminary *Spill Prevention, Containment, and Countermeasures Plan* (SPCCP).

There are no public groundwater supply wells within 400 feet of the Pacific Connector pipeline; however, the route would cross six wellhead protection areas. Pacific Connector identified five private wells within 150 feet of the pipeline, but none of these are used for drinking water. Pacific Connector developed a *Groundwater Supply Monitoring and Mitigation Plan* to ensure that wells are not adversely affected, and an SPCCP that outlines measures that would be implemented to avoid or minimize the potential effects of hazardous material spills during construction on groundwater resources.

The access channel from the existing navigation channel to the Jordan Cove marine slip would affect about 30 acres in Coos Bay. The access channel would be created by dredging about 1.3 million cubic yards of material from the bay bottom. Jordan Cove's *Report on Turbidity Due to Dredging* included a model that predicted total suspended solids (TSS) could be expected to be at a maximum of 500 milligrams per liter (mg/l) at the immediate vicinity of a hydraulic cutterhead dredge, but would rapidly reduce to a maximum of 14 mg/l by a distance of 60 meters. Therefore, turbidity from dredging of the access channel would be temporary (lasting about 4 to 6 months during construction) and localized, minimizing impacts on the aquatic environment of the bay.

The Pacific Connector pipeline would affect 400 waterbodies (some multiple times) within 19 fifth-order watersheds in six hydrological subbasins (Coos, Coquille, South Umpqua, Upper Rogue, Upper Klamath, and Lost River). The pipeline would be installed under three major rivers (Coos, Rogue, and Klamath) using horizontal directional drills (HDD), while three waterbodies (Kentuck Slough, Catching Slough, and the Medford Aqueduct) would be bored. The South Umpqua River would be crossed using Direct Pipe (DP) technology at one location and with diverted crossing methods at a second location. The bores, DP, and HDDs should avoid direct impacts on those rivers and their aquatic environments. Pacific Connector has prepared an *HDD Contingency Plan and Failure Procedure* that describes measures to contain an inadvertent release of drilling mud during the HDD process.

Only Coos Bay, between about MPs 1.7 and 4.1, would be crossed with a wet open-cut method. According to models run by Pacific Connector, turbidity caused by the crossing of Haynes Inlet would not be more than 10 percent above ambient levels for a maximum distance of 350 feet, with concentrations of TSS over 50 mg/l limited to less than 100 feet from actual trenching. Thus, impacts on the aquatic environment of the bay would be localized, and temporary (for the approximate 16 day construction period). Pacific Connector would minimize impacts by following the measures outlined in its *Report on Preliminary Pipeline Study of the Haynes Inlet Water Route*, including keeping the bucket below the water level, following a turbidity monitoring plan, installing turbidity curtains, and fueling and maintaining equipment more than 150 feet from standing water.

The remainder of the waterbodies along the Pacific Connector pipeline route would be dry crossed (using dam-and-pump or fluming methods). All waterbodies would be crossed during the in-water work windows recommended by the Oregon Department of Fish and Wildlife (ODFW), with the pipeline installed below scour depth. Pacific Connector produced a *Stream Crossing Risk Analysis*, and impacts on waterbodies would be minimized by following the FERC's *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures). Impacts on dry-crossed streams would be temporary (with most construction occurring at a single crossing within a 48-hour period), and localized, with models predicting TSS levels less than 100 mg/l within 10 meters downstream of the crossing site. Removal of shade by clearing streamside riparian vegetation would not greatly increase water temperatures. The maximum predicted increase was 0.3°F at one 2-foot-wide crossing; and modeling indicated that instream water temperatures would return to ambient conditions within a short distance downstream from all crossings.

Pacific Connector would use about 75,000 gallons of water per day for dust suppression during construction, and approximately 62 million gallons of water would be required for the hydrostatic testing of the pipeline. At the source, hydrostatic test water would be screened; and released under low velocity conditions through energy dissipating devices and sediment filters in vegetated uplands. Pacific Connector developed a *Draft Hydrostatic Testing Plan* that includes measures to prevent the transfer of aquatic invasive species and pathogens from one watershed to another.

Approximately 38.0 acres of wetlands would be impacted by construction of the Jordan Cove terminal, with approximately 35.6 acres of wetlands being permanently affected during operation. Jordan Cove would follow the measures in its *Project* Co*mpensatory Wetland Mitigation Plan*, including the creation of 7.5 acres of eelgrass in Coos Bay, and the reestablishment of tidal flow to 43.3 acres at the Kentuck Slough site to mitigate for the loss of estuarine wetlands, and creating and preserving 4.5 acres of new wetlands at the West Jordan Cove and West Bridge sites to mitigate for the loss of freshwater wetlands.

The Pacific Connector pipeline route would cross approximately 11.6 miles of wetlands. After pipeline installation, wetlands would be restored; however, about 5.2 acres of palustrine forested wetlands would be converted to herbaceous wetlands. Pacific Connector would minimize impacts on wetlands by following our *Procedures*. Further, the COE would issue permits under the River and Harbors Act (RHA) and section 404 of the Clean Water Act (CWA) for the crossing of waters of the United States, including wetlands, and the ODEQ would issue a Water Quality Certification under section 401 of the CWA. We have included a recommendation that construction not begin until all applicable federal permits have been issued.

Vegetation

The Jordan Cove Project would result in the permanent removal of about 182 acres of upland vegetation, including about 69 acres of forest and 113 acres of shrubs and grasslands. Jordan Cove would compensate for the loss of vegetative habitat by following the measures of its

Wildlife Habitat Mitigation Plan, which requires the acquisition of a total of 259 acres at three off-site parcels, including the preservation of about 103 acres of forest and about 153 acres of shrubs and grasslands.

The Pacific Connector pipeline route would cross about 150 miles of forest and 23 miles of shrubs and grasslands. Of the forested land crossed, about 42.4 miles would be late successional old growth, and 46.5 miles would be mid-seral. Pacific Connector estimated that during clearing of the construction right-of-way, it would harvest about 1,712 acres of large mature trees over 40 years in age and approximately 1,237 acres of younger small to medium sized trees. During operation of the pipeline, a 30-foot-wide corridor would be maintained in an herbaceous state, resulting in the permanent removal of about 545 acres of forest. In accordance with its ECRP, Pacific Connector would replant native conifer species outside of the 30-foot-wide maintenance corridor during restoration of forested area. In addition, Pacific Connector developed an *Integrated Pest Management Plan* to minimize the potential spread of vegetative pests and noxious weeds. Pacific Connector would fund various projects on federal lands that would improve forest structure and health, and reduce the effects of wildfires. This would include 6,563 acres of stand density, 1,152 acres of thinning, 620 acres of planting, and 2,105 acres of fuel deduction.

The applicants conducted botanical surveys to identify plants listed under the Endangered Species Act (ESA) and federal special status species. These surveys found 1 bryophyte and 2 sensitive fungi listed as BLM sensitive species, and 57 fungi, 13 lichens, 1 bryophyte, and 3 vascular plants listed as Forest Service Survey and Manage (S&M) species. Federal sensitive plant species are detailed in appendix O of this EIS. We identified four ESA listed threatened or endangered plant species that are likely to be adversely affected by the Pacific Connector Pipeline Project: Applegate's milk-vetch, Gentner's fritillary, large-flowered meadowfoam, and Kincaid's lupine. Pacific Connector developed a *Federally-listed Plant Conservation Plan* to address how avoidance, minimization, propagation, restoration, and other conservation measures would be applied to protected plant species. We discuss impacts and mitigation for listed plant species in more detail in section 4.7 of this EIS, and in the biological assessment (BA) we submitted to the FWS concurrently with this EIS.

Wildlife and Aquatic Resources

Approximately 178 species of amphibians, reptiles, birds, and mammals occupy upland habitats on the North Spit in the vicinity of the Jordan Cove terminal. Overall, 47 amphibians and reptiles, 278 birds, and 106 mammal species are known or suspected to occur in upland habitats crossed by the Pacific Connector pipeline route. Most mobile species disturbed during construction would relocate to adjacent habitat. In general, construction related impacts on wildlife would be short-term, and after the pipeline is installed, the right-of-way would be revegetated and habitats restored. Only forest within the 30-foot-wide maintenance corridor would be converted to herbaceous vegetation. To reduce impacts on migratory birds, we have recommended that the applicants prepare *Bird Conservation Plans*.

The applicants conducted biological surveys to identify ESA listed species and federal special status species. The Pacific Connector pipeline may potentially affect 3 mammals, 19 birds, 2 amphibians or reptiles, 10 terrestrial invertebrates, 7 aquatic invertebrates, and 6 fish listed as special status species by the BLM and Forest Service. In addition, the Project may affect 2 terrestrial mollusks and 2 invertebrates listed as Forest Service S&M species. Information on special status wildlife species is included in appendix O of this EIS. We identified 9 mammals (including 7 whale species), 5 birds, 5 amphibians and reptiles, 1 invertebrate, and 6 fish that are listed as threatened or endangered species under the ESA that may be affected by the Project. Of those, the Project is likely to adversely affect the marbled murrelet and northern spotted owl, vernal pool fairy shrimp, and five fish species (green sturgeon, coho salmon [both the Southern Oregon-Northern California Coast and Oregon Coast Evolutionary Significant Units], Lost River sucker, and shortnose sucker). Section 4.7 of this EIS and our BA include a detailed analysis of impacts and mitigation measures that apply to the affected ESA listed species.

We identified essential fish habitat (EFH) for groundfish, coastal pelagic species, Pacific Coast salmon, and highly migratory fish within the project area. We consolidated our EFH assessment with our BA, and initiated consultations with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) concurrently with the issuance of this draft EIS. In this EIS, we include a recommendation that we conclude formal consultations with the FWS and NMFS, and that the Services issue their Biological Opinions (BO), before we allow construction of the Project.

Recreational and Visual Resources

Recreational boaters average about 31,560 trips per year in Coos Bay, the majority of which are for fishing. We conclude that LNG vessels in the waterway would not significantly impact recreational users of Coos Bay, because the number of LNG vessels would be less than historic numbers of deep-draft cargo ships that used to call at the Port, recreational boaters could simply move out of the way of LNG vessels in the navigation channel, delays would probably not exceed 30 minutes while an LNG vessel passes in transit. In addition, LNG vessel operators would need to meet any vessel traffic and/or facility control measures determined necessary by the Coast Guard to address navigational safety and maritime security considerations.

The Pacific Connector pipeline route would cross the Hayes Inlet Water Trail, a small segment of the BLM's Upper Rock Creek Area of Critical Environmental Concern (ACEC), three National Scenic Byways (U.S. Highway 101, State Highway 62, and U.S. Highway 97), one National Scenic Trail (Pacific Crest Trail [PCT]), and the Applegate Branch of the California National Historic Trail in two places. The National Park Service agrees that remnants of the historic Applegate Trail are no longer extant at the two pipeline crossing locations, replaced by modern roads. Pacific Connector would implement the measures outlined in its *Recreation Management Plan* to minimize impacts on the PCT and the Haynes Inlet Water Trail and their recreational users. Pacific Connector developed an *Upper Rock Creek ACEC Crossing Plan* to reduce impacts on that land parcel. The pipeline would be installed under U.S. Highway 101 within the waters of Coos Bay, and Pacific Connector would use HDDs to avoid impacts on State Highway 62 and U.S. Highway 97.

The LNG terminal and the South Dunes Power Plant would be located within currently vacant, open land, zoned for water-dependent development and industrial use. The most visible elements of the terminal complex would be the two LNG storage tanks, each to be about 180 feet high and about 270 feet wide, and the three heat recovery steam generators stacks at the power plant that would each be about 100 feet tall. While the LNG terminal could be seen from western portions of the city of North Bend, and places within the BLM's North Spit Shorelands Special Recreation Management Area visual impacts would be minimized because the terminal would be situated next to an existing industrial facility (Roseburg Forest Products), there is a forested dune behind the terminal, the storage tanks would be surrounded by a 60-foot-high earthen storm barrier, and a reduced lighting plan would be implemented.

The majority of the pipeline route (64 percent) would cross forested land. The clearing of forest for the pipeline right-of-way and introduction of new aboveground facilities would have long-term and permanent visual impacts. Pacific Connector has developed an *Aesthetics Management Plan* to lessen visual impacts at key observation points, such as heavily traveled highway crossings. A number of the Forest Service plan amendments address impacts on visual resources on NFS lands.

Socioeconomics and Transportation

Jordan Cove's LNG terminal would be constructed over a 42-month period, with an average workforce of 922 employees. At the peak of construction, there would be about 1,800 non-local people, including workers and their families, needing housing in Coos County. These non-local workers and their families could compete for housing with visitors to Coos County, especially during the summer tourist season. While we estimate that there are 2,580 hotel, motel, and inn rooms within a 50-mile radius of the terminal, plus an additional 5,107 recreational vehicle (RV) hook-ups and campground spots, and about 10,000 rental housing units in Coos County, Jordan Cove would offer housing for its employees at its North Point construction workers complex.

Peak construction activities would result in 2,009 inbound and outbound worker vehicle trips each day to the LNG terminal, together with 40 material delivery truck trips per day. The only road to the terminal is the Trans-Pacific Parkway. Jordan Cove would make improvements at the parkway's intersection with Highway 101, in accordance with its *Traffic Impact Analysis*, to ease traffic congestion. To reduce traffic impacts, Jordan Cove would have employees park at off-site satellite lots and transport them to the terminal by bus or rail. In addition, some equipment deliveries would be made by rail or by barge.

The estimated 90 LNG vessel calls to the terminal each year should not have significant conflicts with other commercial activities in Coos Bay, including the nearly 200 commercial fishing boats based out of the Charleston Marina, and the 60 deep-draft cargo ships and 50 barges that visit the Port yearly. Boats in Charleston Marina may need to wait about 20 minutes for an LNG vessel to pass.

During the two years it would take to construct the pipeline, Pacific Connector would employ an average of 1,400 workers. At the peak of pipeline construction, the Project would attract about 1,106 non-local people, including workers and their families. Workers would be distributed over five construction spreads. For the four counties crossed by the pipeline route combined, we estimate there are total of about 7,889 hotel rooms, 4,460 RV hook-ups, and 21,169 vacant rental houses. If demand for housing exceeds the supply in nearby communities, workers would have to locate farther away and commute to the job site.

About 660 existing roads would be used to access the Pacific Connector pipeline right-of-way and move construction equipment, materials, and personnel. Pacific Connector estimated that 80 percent of the workforce for each spread (peak of 295 workers per spread) would be transported from a contractor yard to and from the right-of-way on crew buses. Impacts on traffic would be minimized by following the measures outlined in Pacific Connector's *Transportation Management Plans*.

Jordan Cove estimated that construction of its LNG terminal and related facilities would cost about $3 billion in 2011 dollars. About $2.6 billion would be for materials, equipment, and other expenditures. Total wages during terminal construction would be $412 million. Jordan Cove estimated that its employees would pay up to $40 million in income taxes to the state of Oregon during the almost four-year-long construction period. During the operation of the LNG terminal, Jordan Cove would employ an average 145 people, with total annual wages of about $12 million. Each year during operation of the terminal, Jordan Cove would make contributions through Coos County's Bay Area Enterprise Zone in lieu of taxes. These contributions would consist of $20 million a year in funding for education and $10 million for urban renewal.

Construction of the pipeline and associated compressor and metering stations would cost approximately $1.74 billion. Total pipeline construction payroll would be about $240 million. Costs for materials and equipment bought in or brought to Oregon are estimated at about $464 million. About $33 million would be spent during construction for local contracted services, such as logging and hauling, road improvements, and professional services. Income taxes on pipeline payroll during construction would be about $46 million for the federal government and about $19.2 million to Oregon. An additional $7 million would be derived from personal property taxes. During operation, the Pacific Connector Pipeline Project would generate approximately $152,360 annually in federal taxes on income, and $65,040 in annual state income taxes. Pacific Connector would also pay an estimated total of $11.1 million in property tax revenues in its first year of operation, divided among the four counties crossed. We conclude that the Project would have positive economic benefits for the region.

Cultural Resources

Cultural resource inventories have been conducted covering the Jordan Cove LNG terminal facilities, except for the temporary North Point construction workers camp. These investigations identified three archaeological sites, which require additional testing and monitoring. Surveys have covered about 201 miles of the pipeline route, 26 pipe or contractor yards, 16 rock source or disposal areas, 497 access road segments, and all the aboveground facilities. These investigations resulted in the identification of 104 archaeological sites within the area of potential effect for the Pacific Connector Pipeline Project. We have determined, after consultations with the Oregon State Historic Preservation Office and applicable federal land management agencies, that 35 sites are not eligible for nomination to the National Register of Historic Places (NRHP) and require no further work. Impacts would be avoided, or the Project would have no adverse effects on 25 sites. Additional information, or testing, is required at 27 sites. Seventeen sites are eligible for the NRHP and data recovery was recommended as mitigation. The resolution of adverse effects at historic properties that would be affected by the Project would be conducted as outlined in a Memorandum of Agreement (MOA) filed with the Advisory Council on Historic Preservation in August 2011 under the previous LNG import and sendout pipeline projects in Docket Nos. CP07-441-000 and CP07-444-000. The MOA also detailed procedures for phased additional investigations in areas where access was previously denied. If the Project is authorized by the Commission, we would update and amend the MOA.

We have consulted with Indian tribes that may attach religious or cultural significance to sites in the region, or may be interested in potential Project impacts on cultural resources. While the applicants have also communicated with interested Indian tribes, we are recommending that before construction can begin, Jordan Cove should finalize its Memorandum of Understanding with the Confederated Tribes of the Siletz Reservation, Confederated Tribes of Coos, Lower

Umpqua, and Siuslaw Indians, and Coquille Tribe of Indians, and Pacific Connector should document meetings and agreements with the Cow Creek Band of Umpqua Tribe of Indians and the Klamath Tribes.

Air Quality and Noise

Jordan Cove's Prevention of Significant Deterioration (PSD) preconstruction permit application demonstrates compliance with all requirements. The airshed basin that contains the project area is in attainment with General Conformity requirements. During construction, a temporary reduction in ambient air quality may result from emissions and fugitive dust generated by equipment. Construction of the LNG terminal would not result in a significant impact on regional air quality or result in any violation of applicable ambient air quality standard. The PSD permit application showed that during terminal operations all carbon monoxide impacts and annual impacts from sulfur dioxide, nitrous oxide (NO_2), and particulate matter with a diameter of less than 10 microns (PM_{10}) were below significant levels. For all pollutants generated during terminal operations, the combined impacts at the points of highest concentration are well below the applicable National Ambient Air Quality Standards (NAAQS) and the PSD increments.

The airsheds through which the pipeline route would pass all attain ambient air quality standards, with the exception that approximately 4.3 miles of pipeline route and the Klamath Compressor Station would be located within the Klamath Falls $PM_{2.5}$ nonattainment area, and about 300 feet of pipeline route within the PM_{10} maintenance area. Pipeline construction would not result in significant impacts on regional air quality or result in any violation of applicable ambient air quality standard. Operation of the Klamath Compressor Station could have 1-hour NO_2 impacts that approach the NAAQS. Potential emissions of Hazardous Air Pollutants from the turbines, boiler, and generator at the station are estimated to be just 1.3 tons per year. Both Jordan Cove and Pacific Connector would obtain required permits issued by the ODEQ under the Clean Air Act (CAA) prior to construction.

Noise from construction of the LNG terminal is expected to be similar to typical commercial structure construction programs, which average from 47 to 57 A-weighted decibels (dBA) at 2,000 feet. These levels would be reduced by more than 15 dBA at the 1.4-mile distance to the nearest noise sensitive area (NSA). Noise from operation of the LNG terminal is predicted to have a day-night sound level (L_{dn}) of about 51.4 dBA at an NSA. This would be below the FERC standard of an L_{dn} of 55 dBA.

Noise from construction of the Pacific Connector pipeline would be temporary, and would dissipate with distance. Pipeline construction noise is predicted to be 93 dBA at 50 feet, and would attenuate to 85 dBA and 72 dBA at 100 feet and 300 feet, respectively. HDDs for the pipeline would generate estimated L_{dn} sound levels between 59.6 to 72.7 dBA at the NSA closest to the Coos River crossing, 62.6 to 70.8 dBA at the NSAs closest to the Rogue River crossing, and 57 to 58.4 dBA at the NSAs closest to the Klamath River crossing. We are recommending that Pacific Connector implement noise mitigation plans for all HDDs to reduce the noise levels below 55 dBA. Operation of the Klamath Compressor Station is predicted to generate L_{dn} levels between 46.7 and 56.1 dBA at the closest NSAs. We are also recommending that both Jordan Cove and Pacific Connector file the results of noise surveys after putting their facilities into service, to document compliance with our standard.

Reliability and Safety

As part of the NEPA review, Commission staff must assess whether the proposed facilities would be able to operate safely and securely. As a result of our technical review of the preliminary engineering design and our recommended mitigation, we believe that the facility design proposed by Jordan Cove includes acceptable layers of protection or safeguards which would reduce the risk of a potentially hazardous scenario from developing into an event that could impact the off-site public.

As a cooperating agency, DOT assisted FERC staff in evaluating whether Jordan Cove's proposed design would meet the DOT siting requirements. On June 18, 2014, DOT provided a letter to the FERC staff stating that DOT had no objection to Jordan Cove's methodology for determining the single accidental leakage sources for candidate design spills to be used in establishing the Part 193 siting requirements for the proposed LNG liquefaction facilities. Based on the hazardous area calculations we reviewed, we conclude that potential hazards from the siting of the facility at this location would not have a significant impact on public safety. The areas impacted by these design spills also appear to meet the DOT's exclusion zone requirements by either being within the facility property boundary, within land controlled by Jordan Cove, or over a navigable body of water. If the facility is constructed and becomes operational, the facility would be subject to DOT's inspection and enforcement program. Final determination of whether a facility is in compliance with the requirements of 49 CFR 193 would be made by DOT staff.

As a cooperating agency, the Coast Guard analyzed the suitability of the waterway for LNG marine traffic. Based on its review and its own independent risk assessment, the Coast Guard has determined that the waterway could be made suitable for the type and frequency of LNG marine traffic associated with the proposed Jordan Cove LNG facility. This opinion was contingent upon the availability of additional measures necessary to responsibly manage the maritime safety and security risks. If appropriate resources are not in place prior to LNG vessel movement along the waterway, then the Coast Guard would consider at that time what, if any, vessel traffic and/or facility control measures would be appropriate to adequately address navigational safety and maritime security considerations.

Cumulative Impacts

Construction of the Project, in addition to other projects within the same watersheds crossed by the pipeline during the same timeframe, would have cumulative impacts on a range of environmental resources, as discussed in section 4.14. We provided information about project-related impacts and mitigation measures for specific environmental resources, and were able to make some general assumptions about other federal projects identified in table 4.14.2.3-1. For the federal projects, there are laws and regulations in place that protect waterbodies and wetlands, threatened and endangered species, and historic properties, and limit impacts from air and noise pollution. Federal land-managing agencies, such as the BLM and Forest Service, have requirements in their LMPs to protect resources on the lands they manage. We do not have good information about potential or foreseeable private projects in the region. For some resources, there are also state laws and regulations that apply to private projects. The analysis area is vast; the 19 fifth-order watersheds crossed by the pipeline route include more than two million acres. While there would be cumulative impacts on resources when all of the foreseeable projects are combined, the magnitude of that impact would be minimal at the landscape scale. Given the

Project BMPs and design features, mitigation measures that would be implemented, federal and state laws and regulations protecting resources, and permitting requirements, we conclude that when added to other past, present, and reasonably foreseeable future actions, the Project would not have significant adverse cumulative impacts on environmental resources within the watersheds crossed by the Pacific Connector pipeline route.

MAJOR CONCLUSIONS

We conclude that construction and operation of the Project would result in some limited adverse environmental impacts. However, most of these impacts would be reduced to less-than-significant levels with the implementation of the applicants' proposed mitigation measures and the additional measures we recommend in this EIS. The primary reasons for our decision are:

- LNG marine traffic in the waterway would be required to adhere to any vessel traffic and/or facility control measures determined necessary by the Coast Guard to address navigational safety and maritime security considerations;
- the final engineering design for the LNG terminal would incorporate detailed seismic specifications and other measures to protect the terminal from future earthquakes and potential tsunamis, and mitigation measures would be implemented by Pacific Connector to address landslides and other geological hazards along the pipeline route;
- Jordan Cove would implement FERC's *Plan* and *Procedures* and its own *Erosion and Sediment Control Plan*, and Pacific Connector would implement its project-specific ECRP, which would minimize impacts on soils, waterbodies, and wetlands;
- Jordan Cove would implement the measures of its *Project Compensatory Wetland Mitigation Plan* to mitigate for the loss of wetlands, and its *Wildlife Habitat Mitigation Plan* to mitigate for the loss of vegetation at the terminal location;
- Pacific Connector would implement the measures in its *Stream Crossing Risk Analysis*, *Report on Preliminary Pipeline Study of the Haynes Inlet Water Route, HDD Contingency Plan and Failure Procedures,* and *Draft Hydrostatic Testing Plan* to minimize impacts on waterbodies, and its *Integrated Pest Management Plan* to minimize the potential spread of vegetative pests and noxious weeds;
- the COE and ODEQ would issue permits to Jordan Cove and Pacific Connector under the RHA, CWA, and CAA that would contain measures to minimize impacts on water quality and air quality;
- Jordan Cove and Pacific Connector would obtain a determination from ODLCD that the Project is consistent with the CZMA;
- the BLM and Forest Service would amend their respective LMPs in the appropriate Districts and National Forests to allow for the pipeline, and the BLM would issue a Right-of-Way Grant to Pacific Connector for an easement over federal lands, to be concurred with by the Forest Service and Reclamation, based on the implementation of an approved Plan of Development that includes additional measures to minimize impacts on environmental resources;
- Jordan Cove and Pacific Connector would implement the measures in their Compensatory Mitigation Plan and our BA and EFH Assessment to mitigate for impacts on federally listed threatened and endangered species, and the NMFS and FWS would issue BOs that include additional conservation measures to assure that the Project would not jeopardize the continued existence of any species under their jurisdiction and would not adversely modify or destroy designated critical habitat;

- adverse effects on historic properties would be resolved through an amended Project MOA;
- the LNG terminal would meet the federal safety regulations regarding the thermal radiation and flammable vapor dispersion exclusion zones and appropriate design standards, and Pacific Connector's natural gas facilities would also be designed, constructed, and operated in accordance with DOT safety standards; and
- an environmental inspection and mitigation monitoring program would be implemented to ensure compliance with all mitigation measures that become conditions of any FERC authorization.

1.0 INTRODUCTION

1.1 PROJECT SUMMARY

On May 21, 2013, Jordan Cove Energy Project, L.P. (Jordan Cove)[1] filed an application for its liquefaction project with the Federal Energy Regulatory Commission (FERC or Commission) under Section 3 of the Natural Gas Act (NGA). Pacific Connector Gas Pipeline, LP (Pacific Connector)[2] filed its companion application with the FERC for the supply pipeline to Jordan Cove's liquefied natural gas (LNG) terminal under Section 7 of the NGA on June 6, 2013. The FERC issued a Notice of Application for the Jordan Cove Liquefaction Project on May 30, 2013, and a Notice of Application for the Pacific Connector Pipeline Project was issued on June 19, 2013. Hereafter in this environmental impact statement (EIS), Jordan Cove and Pacific Connector are also referred to as the applicants, and their inter-related proposals are collectively referred to as the Jordan Cove Energy and Pacific Connector Gas Pipeline (JCE & PCGP) Project, or the Project.[3]

In Docket No. CP13-483-000, Jordan Cove seeks authorization to construct and operate a new LNG export terminal in Coos County, Oregon. The terminal would be capable of receiving natural gas, processing that gas, liquefying the gas into LNG, storing the LNG, and loading the LNG onto vessels at its marine dock. Jordan Cove requested Commission approval to produce up to 6 million metric tons per annum (MMTPA) of LNG, using a supply of approximately 0.9 billion cubic feet per day (Bcf/d) of natural gas.

In Docket No. CP13-492-000, Pacific Connector seeks a Certificate of Public Convenience and Necessity (Certificate) to construct and operate a new 232-mile-long, 36-inch-diameter natural gas transmission pipeline, crossing through Klamath, Jackson, Douglas, and Coos Counties, Oregon. The pipeline would be designed to transport approximately 1.06 Bcf/d from interconnections with the existing Ruby Pipeline LLC (Ruby)[4] and Gas Transmission Northwest LLC (GTN) systems near Malin, Oregon. The design assumes that about 0.04 Bcf/d would be delivered to the Pacific Connector Clarks Branch Meter Station in Douglas County, while 1.02 Bcf/d would be reserved for delivery to the Jordan Cove Meter Station at the Coos Bay terminus of the pipeline in Coos County.

Pacific Connector also requested a blanket certificate to allow for future construction, operation, and abandonment activities under Subpart F of Title 18 Code of Federal Regulations (CFR) Part 157 of the Commission's regulations, and requested a blanket certificate to provide open-access

[1] Seventy-five percent of Jordan Cove is controlled by Jordan Cove LNG LP, a Delaware limited partnership that is a subsidiary of Veresen Inc. (Veresen), and 25 percent is controlled by Energy Projects Development LLC, a Colorado limited liability company owned by private investors. See Jordan Cove's April 23, 2014 filing with the FERC in Docket No. CP13-483-000.

[2] Pacific Connector is a joint venture between Veresen and the Williams Companies Inc. (Williams), with Williams Pacific Connector Gas Operator LCC as the manager and operator of the pipeline.

[3] Individually, the Jordan Cove proposal is referred to as the Jordan Cove Liquefaction Project, Jordan Cove LNG terminal, Jordan Cove Project, or Jordan Cove facilities; the Pacific Connector proposal may be referenced similarly, as the Pacific Connector Pipeline Project, Pacific Connector pipeline, or pipeline project.

[4] Veresen, the partner who owns portions of Jordan Cove and Pacific Connector, recently acquired a 50 percent stake in the Ruby Pipeline; see Natural Gas Intelligence, 29 September 2014, "Veresen Sees New Ruby Pipeline Stake as Upside for Jordan Cove LNG."

transportation services under its tariff in accordance with Subpart G of Part 284. Requests for these future actions performed under the blanket program are restricted to minor actions and would be filed as prior notices or in annual reports that would be subject to individual environmental reviews by FERC staff in accordance with Part 157.206.

The FERC is the federal agency responsible for authorizing onshore LNG terminals and interstate natural gas transmission facilities, as specified in Section 311(e)(1) of the Energy Policy Act of 2005 (EPAct) and the NGA. For the JCE & PCGP Project, in accordance with Section 313(b)(1) of the EPAct, the FERC is the lead federal agency for the coordination of all applicable federal authorizations, and is also the lead federal agency for preparation of this EIS in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), as outlined in the Council on Environmental Quality (CEQ) regulations for implementing the NEPA (40 CFR Parts 1500-1508).

The United States (U.S.) Department of Agriculture Forest Service (Forest Service) Pacific Northwest Region; U.S. Army Corps of Engineers (COE) Portland District; U.S. Department of Energy (DOE); U.S. Environmental Protection Agency (EPA) Region 10; U.S. Department of Homeland Security Coast Guard (Coast Guard) Portland, Sector Columbia River; U.S. Department of the Interior Bureau of Land Management (BLM) Oregon State Office, Bureau of Reclamation (Reclamation) Klamath Basin Area Office , and Fish and Wildlife Service (FWS) Oregon State Office; and the Pipeline and Hazardous Materials Safety Administration (PHMSA) within the U.S. Department of Transportation (DOT) are cooperating agencies, as defined in 40 CFR Part 1501.6, for the development of this EIS. A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposal, and can participate in the NEPA analysis.

The Forest Service, COE, DOE, EPA, BLM, Reclamation, FWS, and DOT are cooperating in a manner consistent with an interagency agreement signed in May 2002 with the FERC regarding early coordination of required environmental and historic preservation reviews of interstate natural gas pipeline facilities.[5] The Coast Guard and DOT are also cooperating with the FERC under the terms of a February 2004 interagency agreement for review of LNG facilities.[6] The purpose and scope of the actions of the federal cooperating agencies with regards to the review of this Project are further summarized in sections 1.4.2 and 1.4.3 below. Together with the cooperating agencies, it is the intent of the FERC to produce an EIS that satisfies the requirements of the NEPA. Prior to issuance of this EIS, the cooperating agencies had opportunities to review preliminary and administrative drafts and comment to the FERC.

While the FERC authorizes the siting, construction, and operation of onshore LNG terminals, authorization to export LNG to foreign countries is granted by the DOE's Office of Fossil Energy. The DOE authorized Jordan Cove to export LNG to free trade agreement (FTA) nations

[5] May 2002 Interagency Agreement on Early Coordination of Required Environmental and Historic Preservation Reviews Conducted in Conjunction With the Issuance of Authorizations to Construct and Operate Interstate Natural Gas Pipelines Certificated by the Federal Energy Regulatory Commission, signed by the FERC, Advisory Council on Historic Preservation, CEQ, EPA, Department of the Army, Department of Agriculture, Department of Commerce, DOE, Department of the Interior, and DOT.

[6] February 2004 Interagency Agreement Among the Federal Energy Regulatory Commission, United States Coast Guard, and Research and Special Programs Administration for the Safety and Security Review of Waterfront Import/Export Liquefied Natural Gas Facilities.

in 2011, and authorized the export of LNG to non-FTA nations in March 2014.[7] The purpose and need for the DOE actions are further summarized below in section 1.4.3.3.

The BLM and Forest Service would use this EIS in their assessments of amendments they are considering to their land management plans (LMP) for the Coos Bay, Roseburg, Medford, and Lakeview Districts, and for Umpqua, Rogue River, and Winema National Forests, to allow for the Pacific Connector Pipeline. In addition, the BLM would use this EIS when considering the issuance of a Right-of-Way Grant to Pacific Connector for a pipeline easement over federal lands, with concurrence from the Forest Service and Reclamation (as further discussed below in sections 1.5.2 and 4.1.3.4).

1.1.1 Background

Natural gas, which is primarily methane (CH_4), is a naturally occurring fossil fuel that is used for a variety of purposes, including industrial, electric generation, home heating and cooking, and in some cases as a fuel for motor vehicles. Natural gas is obtained from underground sources and transported in pipelines from its place of production to customers. In the United States, the interstate transportation of natural gas via pipelines and its storage as LNG[8] are regulated by the FERC. Domestic exploration, production, gathering, and intrastate transportation of natural gas, including local distribution pipeline networks to individual consumers, are activities regulated by the states.

LNG is natural gas that has been cooled to about -260 degrees Fahrenheit (°F), which turns the gas into a liquid. As a liquid, LNG is about 600 times more compact than its equivalent amount of gas vapors. Once liquefied, it can then be stored in cryogenic containers, and transported great distances overseas between natural gas producing countries and consumers using specially designed ships. After receipt at an import terminal, the LNG can be warmed and vaporized back into a gaseous state.

On September 4, 2007, Jordan Cove, in Docket No. CP07-444-000, filed an application with the FERC to construct and operate an LNG import terminal at Coos Bay, Oregon. That same day, Pacific Connector, in Docket No. CP07-441-000, filed an application with the FERC to construct and operate a 234-mile-long, 36-inch-diameter natural gas sendout pipeline connecting the Jordan Cove LNG import terminal with existing natural gas transportation systems, including the facilities of Northwest Pipeline GP (Northwest), Avista Corporation (Avista), GTN, Tuscarora Gas Transmission Company (Tuscarora), and Pacific Gas and Electric Company (PG&E). The purpose of the Jordan Cove LNG import terminal was to provide new sources of natural gas to the West Coast of the United States. It was Pacific Connector's original intent to transport those additional supplies of natural gas from the Jordan Cove terminal to markets in Oregon, California, and Nevada. In May 2009, the FERC produced a final EIS (FEIS) for Docket Nos. CP07-441-000 and CP07-444-000. The Commission authorized both the Jordan Cove LNG

[7] The DOE issued its *Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Jordan Cove LNG Terminal to Free Trade Agreement Nations* on December 7, 2011 in FE Docket No. 11-127-LNG. On March 24, 2014, DOE issued its *Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel From the Jordan Cove LNG Terminal in Coos Bay, Oregon to Non-Free Trade Agreement Nations* in Docket No. 12-32-LNG (DOE/FE Order No. 3413).

[8] LNG storage in cryogenic tanks for domestic pipeline transportation, not an import or export terminal, is referred to as a "peak shaving plant."

import terminal and the Pacific Connector sendout natural gas pipeline in an *Order Granting Authorizations Under Section 3 of the Natural Gas Act and Issuing Certificates* on December 17, 2009.

On April 16, 2012, the Commission issued an *Order Granting Rehearing in Part, Dismissing Request for Stay, and Vacating Certificate and Section 3 Authorizations* that vacated the authorizations for both the Jordan Cove LNG import terminal in Docket No. CP07-444-000 and the associated Pacific Connector sendout pipeline in Docket No. CP07-441-000. The Commission vacated the authorizations because the LNG import purpose for the project was no longer feasible.[9]

Despite the vacation of Jordan Cove's LNG import proposal and the associated Pacific Connector sendout pipeline, including the public records supporting its original December 17, 2009 authorizations, the Commission held that portions of our[10] FEIS produced in May 2009 could still be valid for re-use. As stated in footnote 36 on page 11, Section IV of the April 16, 2012 Commission Order: "Depending on the details of the proposed project, it is possible that portions of the environmental information and analysis developed in conjunction with the import terminal may remain viable for resubmission and use for the contemplated export terminal and associated pipeline facilities."[11] Therefore, where applicable, this current EIS references information from the May 2009 FEIS.

On February 29, 2012, Jordan Cove requested that the FERC consider initiating the environmental pre-filing process for its liquefaction project. The FERC accepted that request on March 6, 2012, and assigned Docket No. PF12-7-000 to the Jordan Cove LNG export proposal. On June 7, 2012, Pacific Connector filed its revised request to initiate the FERC's environmental pre-filing process for its newly proposed pipeline project. The FERC accepted that request on June 8, 2012, assigning Docket No. PF12-17-000 to the new Pacific Connector pipeline proposal. The public scoping activities that were part of the FERC's pre-filing process, including consultations with stakeholders, are described in section 1.6 below.

1.1.2 Current Proposals

The proposed action analyzed in this EIS includes the activities outlined in Jordan Cove's and Pacific Connector's applications to the FERC. The Commission and cooperating agencies would consider the potential environmental impacts of the applicants' proposals as disclosed in this EIS prior to making their decisions.

The main jurisdictional facilities associated with Jordan Cove's LNG export terminal include:

- access channel from the existing Coos Bay navigation channel to the terminal marine slip;
- marine slip, with a berth for one LNG vessel on the east side and a berth for tug boats on the north side;

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[9] 139 FERC § 61,040, Section IV., page 7, paragraph 20.

[10] The pronouns "we," "us," and "our" refer to the environmental staff of the FERC's Office of Energy Projects (OEP). In addition, we consider the staffs of our third-party environmental contractor, and the federal cooperating agencies and their contractors who are participating in the production of this EIS to be an extension of the FERC staff.

[11] 139 FERC § 61,040

- LNG loading system, consisting of three 16-inch-diameter loading arms and one 16-inch-diameter vapor return arm, with a peak capacity of 12,000 cubic meters per hour (m3/hr), installed on a shore-side platform;
- LNG transfer line, consisting of one 2,300-foot-long, 36-inch-diameter cryogenic pipeline, from the storage tanks to the LNG vessel berth;
- LNG storage system, consisting of two full-containment LNG storage tanks, each with a net capacity of 160,000 m3 (1,006,000 barrels), and each equipped with two fully submerged LNG in-tank pumps sized for approximately 11,600 gallons per minute (gpm);
- boil-off gas (BOG) recovery system, used to control the pressure in the LNG storage tanks, consisting of three cryogenic centrifugal BOG compressors, each rated for approximately 10,160 actual cubic feet per minute (ACFM);
- four natural gas liquefaction trains, each with the export capacity of 1.5 MMTPA of LNG;
- refrigerant storage and resupply system, comprised of a total of three horizontal storage bullets, each holding one of the three hydrocarbon refrigerants (ethylene, propane, and isopentane) that provide make-up to the single mixed refrigerant cryogenic loop;
- aerial cooling system (Fin-Fan), to reject heat removed during the LNG liquefaction process;
- emergency vent system and ground flare, LNG spill containment system, fuel gas, nitrogen, instrument/plant air systems, electrical and lighting systems, service water system, fire water ponds and fire water delivery system, operational controls, and various hazard detection and prevention systems;
- utility corridor, about 1 mile long and 150 feet wide, between the LNG terminal and the South Dunes Power Plant, including a 230-kilovolt (kV) transmission line and access road; and
- a pipeline gas conditioning facility, consisting of two feed gas cleaning and dehydration trains with a combined natural gas throughput of approximately 1 Bcf/d; and
- other security and control facilities, administrative buildings, and support structures associated with the terminal.

The non-jurisdictional facilities associated with the Jordan Cove's LNG export terminal would include:

- South Dunes Power Plant, consisting of a nominal 420-megawatt (MW) natural gas–fired combined cycle electric generating system and heat recovery steam generator units;
- Southwest Oregon Regional Security Center (SORSC); and
- other security and control facilities, administrative buildings, and support structures associated with the power plant.

The main jurisdictional natural gas pipeline facilities proposed by Pacific Connector include:

- a 232-mile-long,[12] 36-inch-diameter welded steel underground pipeline, capable of transporting about 1.07 Bcf/d of natural gas from interconnections with existing supply pipelines near Malin;

[12] The total length of the pipeline does not match the mileposts (MP), which have been retained from the original route proposed in Docket No. CP07-441-000. Where realignments have been adopted into the proposed route, the

- the Klamath Compressor Station, with one new compressor rated at 41,000 International Organization for Standardization (ISO) horsepower (hp), and one additional standby unit of 20,500 ISO hp, at the eastern beginning of the pipeline, about milepost (MP) 228.1;
- four meter stations, including the Klamath-Beaver Meter Station and Klamath-Eagle Meter Station co-located within the Klamath Compressor Station tract, the Clarks Branch Meter Station at MP 71.5, and the Jordan Cove Meter Station at MP 1.5R;
- five pig[13] launcher or receiver units, co-located with other aboveground facilities;
- 17 mainline block valves (MLV); and
- a gas control communication system, including 11 radio towers, co-located at other facilities.

The non-jurisdictional facilities associated with the Pacific Connector Pipeline Project include electric lines to the meter stations and compressor station.

The general location of facilities proposed by Jordan Cove and Pacific Connector, as well as the extent of various land-ownerships, are shown on figure 1.1-1. The facilities are more fully described in section 2.1 of this EIS.

1.1.3 Major Differences Between the Original and Current Proposals

The major difference between Jordan Cove's original proposal in Docket No. CP07-444-000 and its current proposal in Docket No. CP13-483-000 is the change from an LNG import terminal to an export terminal based on changes since 2007 in the availability of domestic natural gas. The switch to LNG export rather than import resulted in some design changes at the terminal. For example, the vaporizers which were critical elements for an LNG import terminal would be unnecessary at an export terminal, and instead would be replaced by liquefaction trains, and the addition of refrigerant resupply and storage, and aerial cooling system. The natural gas liquids extraction facility for the LNG import proposal in Docket No. CP07-444-000 would not be necessary for the export proposal, and would be replaced by a pipeline natural gas processing plant.

While the waterway for LNG marine traffic is the same, the number of LNG vessels visiting the terminal is expected to increase from 80 vessels per year in the import proposal to 90 vessels per year for the export project. The slip for the export terminal is being redesigned to incorporate a new open cell technology sheet pile berth on the east side for LNG vessels. The new berth design would eliminate many of the previously proposed pilings to be installed in the slip.

MPs are designated with an "R." In addition, the MPs are reversed, numbered from west to east, again as a reflection of the engineering design for the original pipeline for the vacated LNG import project. Now, in Docket No. CP13-492-000, the Pacific Connector pipeline would begin at the Klamath Compressor Station at MP 228.1 and terminate at the Jordan Cove Meter Station at MP 1.5R.

[13] A pig is an internal pipeline cleaning and inspection tool.

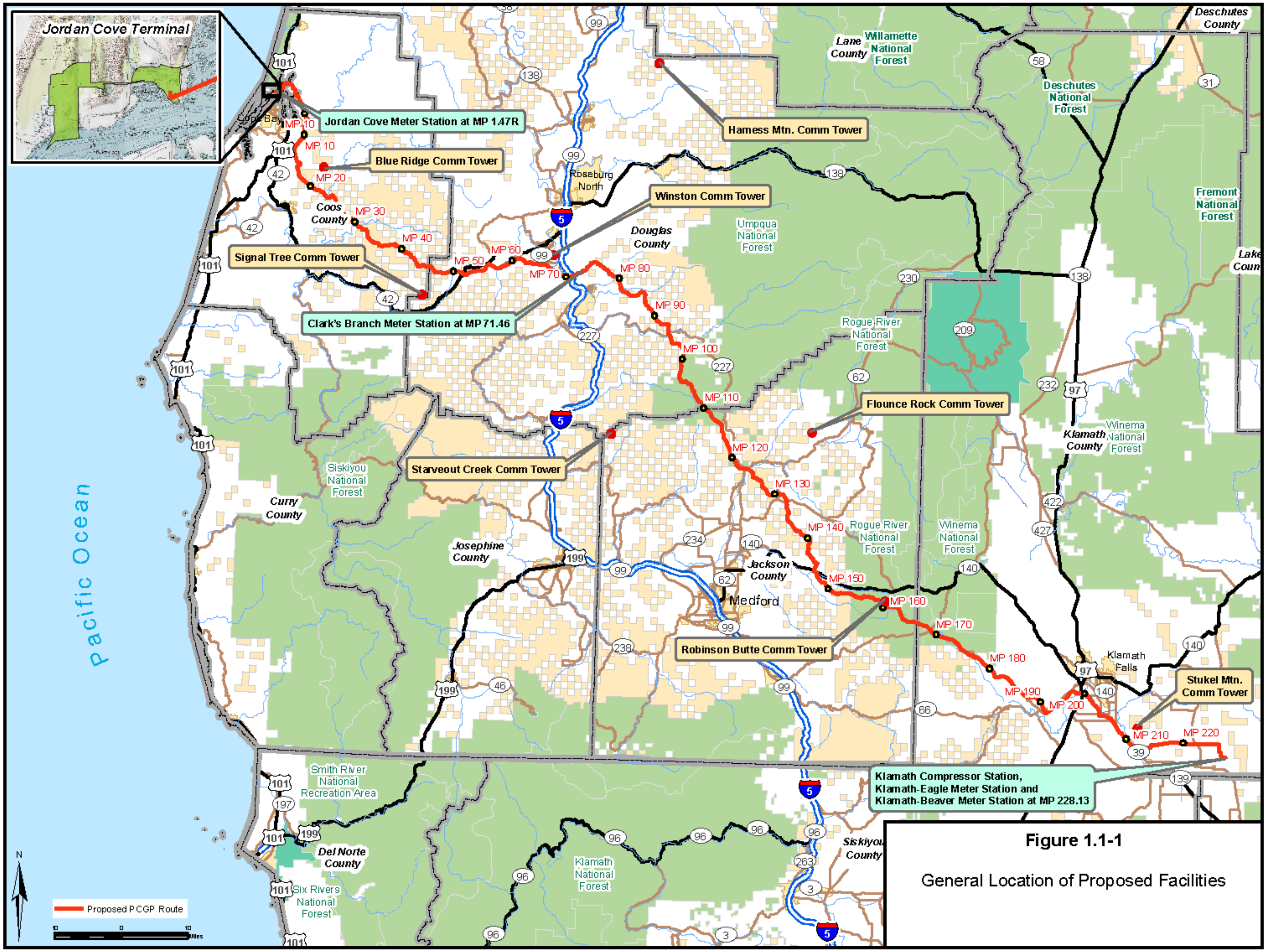

Figure 1.1-1

General Location of Proposed Facilities

Two excavated and dredged material disposal areas associated with the original LNG import terminal proposal would be eliminated from the current LNG export terminal proposal. This includes elimination of the Jordan Cove Excavated Material Stockpile Site on the north side of the LNG terminal, because those materials would now be placed at the former Weyerhaeuser linerboard mill site, where the newly planned South Dunes Power Plant would be located, about 1 mile east of the liquefaction facility. The firewater ponds for the LNG export terminal would now be relocated to the former site of the Jordan Cove Excavated Material Placement Site within the terminal tract. The Port Commercial Sand Stockpile Site and the slurry pipeline between the terminal and the stockpile site, proposed in Docket No. CP07-444-000, would also be eliminated for the export project, as the materials dredged during construction of the access channel would now be deposited at the former Weyerhaeuser linerboard mill site.

The 420-MW South Dunes Power Plant would take the place of the smaller 37-MW electric power plant within the import terminal tract, as planned under Docket No. CP07-444-000. A new 1-mile-long, 150-foot-wide utility corridor would be installed between the South Dunes Power Plant and the LNG export terminal.

In addition, some of the support buildings at the terminal have changed or been relocated since the original proposal. A new SORSC would be erected on the east side of Jordan Cove Road, south of the Trans-Pacific Parkway. The firewater pump building would be moved to the new location for the firewater ponds in the northwest corner of the terminal tract. A new barge dock would be located on the southeast side of the marine slip.

A number of new temporary work areas were identified that would be necessary during construction of the LNG export terminal. A temporary workers construction camp (North Point) would be located on the north side of the city of North Bend, south of the McCullough Bridge. New temporary laydown areas to be used during construction would be located north of the liquefaction trains within the LNG terminal, west of the gas processing plant, and south of the South Dunes Power Plant (see figure 2.1-2, in the next chapter of this EIS).

In addition, Jordan Cove identified three new wetland mitigation areas. They include the West Bridge site on the east side of the existing Roseburg Forest Products property, the West Jordan Cove site located southeast of the West Bridge site, and the Kentuck Slough site on the north side of Coos Bay about 3 miles east of the LNG terminal (see figure 2.1-1, in the next chapter).

Table 1.1.3-1 lists both the elements deleted from the former LNG import terminal in Docket No. CP07-444-000, and the elements added or modified for the newly proposed LNG export terminal in Docket No. CP13-483-000.

TABLE 1.1.3-1

Major Differences Between the Previous LNG Import Proposal in Docket No. CP07-444-000 and the Current Jordan Cove Export Terminal in Docket No. CP13-483-000

Element	Size/Location a/	Reasons for the Changes
Elements Deleted or Modified from the Formerly Proposed LNG Import Terminal in Docket No. CP07-444-000		
LNG unloading platform overwater at the vessel berth	16 acres for the LNG vessel berth and transfer pipeline on the east side of the terminal marine slip.	The LNG unloading platform over water on the east side of the marine slip would be removed for the new export terminal proposal, and replaced by new open cell technology sheet pile LNG vessel berth design and onshore loading platform for the export proposal.

TABLE 1.1.3-1

Major Differences Between the Previous LNG Import Proposal in Docket No. CP07-444-000 and the Current Jordan Cove Export Terminal in Docket No. CP13-483-000

Element	Size/Location a/	Reasons for the Changes
Gas vaporizers	Six submerged combustion vaporizers located within the 20-acre LNG terminal process area.	Gas vaporizers are not necessary for a liquefaction project.
Natural gas liquid extraction facilities	Less than 1 acre, to the east of the LNG terminal, within the Roseburg Forest Products property.	Natural gas liquid extraction facilities are not necessary for the liquefaction project. Replaced by pipeline natural gas conditioning facility, to be located on the west side of the South Dunes Power Plant.
37-MW power plant	Located within the 20-acre LNG terminal process area.	This small plant was replaced by the larger 420-MW South Dunes Power Plant, as more electricity would be needed for the liquefaction project.
Administration building	55-foot by 81-foot sized building, within 18 acres located along the former access road to the LNG terminal.	Replaced by new control building along new utility corridor, and new administration building on the north side of the new gas processing plant between the South Dunes Power Plant and Jordan Cove Road.
Jordan Cove excavated material placement site	149 acres on the north side of the LNG terminal.	Materials excavated during construction of the marine slip would now be placed at the South Dunes Power Plant site.
Port commercial sand stockpile site	68 acres, on the North Spit about 1.5 miles southwest of the LNG terminal.	Materials dredged during construction of the access channel would now be placed at the South Dunes Power Plant site.
Dredged material slurry pipeline to port commercial sand stockpile site	3 acres, on the North Spit extending 1.6 miles from LNG Terminal to the formerly proposed Port Commercial Sand Stockpile Site.	Elimination of the Port commercial sand stockpile site eliminates the need for the slurry pipeline to that site.
Elements Added to or Modified at the Newly Proposed LNG Export Terminal in Docket No. CP13-483-000		
90 LNG vessel visits per year	Waterway for LNG marine traffic would use existing navigation channel in Coos Bay, which is 300 feet wide and 7.5 miles long to the Jordan Cove terminal.	Increase in number of LNG vessel visits for export from 80 per year for the import proposal.
LNG vessel berth and loading platform	9 acres, including the transfer pipeline, on the east side of the marine slip.	New open cell technology sheet pile for LNG vessel berth on east side of the Marine Slip. Loading facilities would be constructed on upland shore side, rather than on a platform over water as in the former berth design.
Barge dock	3 acres on the southeast side of the marine slip.	Barge dock needed to bring equipment and materials to the terminal.
LNG storage tanks	27 acres, north of the marine slip within the LNG terminal processing area.	Two LNG storage tanks shifted slightly to the west from original import proposal, with redesigned elevation and berm, and relocated impoundment basin.
Liquefaction trains	20 acres, on the east side of the terminal processing area.	Four liquefaction trains needed for LNG export proposal. They replace six vaporizers formerly proposed for the import project.
Refrigerant storage and resupply system	2 acres, north of the LNG storage tanks within the terminal processing area.	Needed for liquefaction.
Flare	1 acre, north of the refrigerant storage area within the terminal.	Flare redesigned and location changed.
Temporary construction laydown area	21 acres, northeast of the flare within the terminal.	Reconfigured for liquefaction project.
Terminal firewater pond and new pump building	4 acres, at northwest corner of the terminal tract.	Location moved to former location of Jordan Cove excavated material placement site for import proposal.
Terminal control building and warehouse	8 acres, along the new utility corridor between the South Dunes Power Plant area and the LNG terminal.	New design for the liquefaction project.

TABLE 1.1.3-1

Major Differences Between the Previous LNG Import Proposal in Docket No. CP07-444-000 and the Current Jordan Cove Export Terminal in Docket No. CP13-483-000

Element	Size/Location a/	Reasons for the Changes
Industrial wastewater line relocation	13 acres, north of the terminal, parallel to the Trans-Pacific Parkway.	Existing industrial wastewater line used by Weyerhaeuser to be relocated to allow for construction of the LNG terminal.
Raw water line relocation	3 acres, north of the South Dunes Power Plant area, parallel to the Trans-Pacific Parkway.	Existing water line to be relocated for liquefaction project.
Utility corridor from South Dunes Power Plant to LNG terminal	11 acres, 1 mile long and 150 feet wide, between South Dunes Power Plant and LNG terminal.	New utility corridor, for electric power lines and access road, from power plant to LNG terminal, as more electricity is needed for liquefaction project.
Southwest Oregon Regional Safety Center	8 acres, on east side of Jordan Cove Road, west of the South Dunes Power Plant.	New facility for fire protection, Sheriff, Coast Guard, and Port offices.
Temporary gas processing plant construction laydown areas	4 acres, east of the SORSC and west of the gas processing plant.,	Newly identified areas for construction of the South Dunes Power Plant and related nearby facilities.
South Dune administration building, operations building, control building, hazardous material storage building, guard house, electrical powerhouse, and firewater pumphouse	4 acres, north of the gas processing plant.	New support buildings needed for the power plant complex.
Gas processing plant	9 acres, on the west side of the South Dunes Power Plant.	New pipeline gas conditioning facility needed for liquefaction project.
420-MW South Dunes Power Plant	58 acres, at former Weyerhaeuser linerboard mill site, 1 mile east of the LNG Terminal, on the northeast side of geographic Jordan Cove.	Replaces smaller electric power plant formerly proposed for the LNG import terminal. More electricity would be needed for liquefaction project.
South Dunes temporary construction laydown areas and stormwater pond	11 acres, south of the South Dunes Power Plant.	Newly identified as needed for construction and operation of the South Dunes Power Plant.
Temporary North Point construction workers camp	49 acres, on the North Bend side of the McCullough Bridge, about 2 miles southeast of LNG terminal.	New construction worker housing proposed for liquefaction project.
West Jordan Cove wetland mitigation site	3 acres, east of the LNG terminal and west of the power plant.	Newly identified area to be dredged to create new estuarine wetland habitat to mitigate for wetlands lost during construction and operation of the liquefaction project.
West Bridge wetland mitigation site	2 acres , on the east side of the Roseburg Forest Products property.	Newly identified area to be maintained as a wetland to mitigate for wetlands lost during construction and operation of the liquefaction project.
Kentuck Slough Wetland Mitigation Site	44 acres , on the north side of Coos Bay, about 3 miles east of the LNG terminal.	Newly identified area to be maintained as a wetland to mitigate for wetlands lost during construction and operation of the liquefaction project.

a/ Acres rounded to the nearest whole acre.

The Pacific Connector pipeline would be basically the same as in Docket No. CP07-441-000, except the direction of the transportation of the natural gas is reversed, now going east to west. Instead of taking natural gas from the Jordan Cove terminal at Coos Bay and delivering it to the Oregon-California border, as proposed in CP07-441-000, the new pipeline proposal in Docket No. CP13-492-000 would take gas from the Malin hub to the Jordan Cove terminal. The Tulelake, Russell Canyon, and Buck Butte Meter Stations formerly proposed under Docket No. CP07-441-000 have been eliminated from the new proposal under Docket No. CP13-492-000, because Pacific Connector would no longer be providing natural gas to GTN, PG&E, and Tuscarora to serve markets in Oregon, California, and Nevada. In their place, Pacific Connector would construct and operate the new Klamath-Eagle and Klamath-Beaver Meter Stations, at new interconnections to receive natural gas from GTN and Ruby, within the newly proposed Klamath

Compressor Station tract. The Butte Falls Compressor Station, formerly located at MP 132.1 under Docket No. CP07-441-000, would be eliminated from the new project in Docket No. CP13-492-000, as Pacific Connector would now compress gas at the eastern beginning of its pipeline, at the Klamath Compressor Station, at MP 228.1.

The Shady Cove Meter Station proposed in Docket No. CP07-441-000 has been removed from the new pipeline Project under Docket No. CP13-492-000 because Pacific Connector no longer intends to provide natural gas to the Avista system. The Clarks Branch Meter Station has been relocated to about MP 71.5 along the new realignment for the crossing of Interstate (I)-5 and the South Umpqua River. The location of the Jordan Cove Meter Station was relocated to MP 1.5R, adjacent to the newly planned South Dunes Power Plant, which is part of the Jordan Cove Liquefaction Project in Docket No. CP13-483-000. In addition, Pacific Connector has identified 17 new locations of its MLVs along the pipeline route.

The pipeline route remains relatively unchanged from that proposed under Docket No. CP07-441-000, and as analyzed in our May 2009 FEIS; however, under the current proposal in Docket No. CP13-492-000, there are four main pipeline route realignments: (1) Brunschmid Wetland Reserve (MPs 9.4R to 12.4R); (2) Weaver Ridge (MPs 42.7 to 49.8); (3) I-5 and Western South Umpqua River Crossings (MPs 67.5 to 74.8); and (4) McLoughlin Lane (MPs 187.4 to 191.1). Table 1.1.3-2 lists both the elements deleted from the former pipeline project in Docket No. CP07-441-000, and the elements added or modified for the newly proposed pipeline project in Docket No. CP13-492-000.

TABLE 1.1.3-2

Major Differences Between the Original Pipeline Project Proposed in Docket No. CP07-441-000 and the Current Pacific Connector Project Proposed in Docket No. CP13-492-000

Element	Acres/Location a/	Reasons for the Changes
Elements Deleted or Modified from the Formerly Proposed Pacific Connector Pipeline Project in Docket No. CP07-441-000		
Jordan Cove Meter Station	2 acres, at original pipeline MP 0.0	Relocated to MP 1.5R, adjacent to the newly planned South Dunes Power Plant for the liquefaction project.
Clarks Branch Meter Station	1 acre, at original pipeline MP 69.7	Relocated to MP 71.5 along realignment for new crossings of I-5 and South Umpqua River.
Shady Cove Meter Station	3 acres, at original pipeline MP 122.1	Eliminated, as Pacific Connector would no longer be connecting to the Avista system.
Butte Falls Compressor Station	7 acres, at original pipeline MP 132.1	Eliminated; instead the compressor station would be moved to the eastern starting point of the Pacific Connector pipeline at MP 228.1.
Tulelake, Russell Canyon, and Buck Butte Meter Stations	7 acres, at original pipeline MP 230.9	Eliminated, as natural gas would no longer be delivered to GTN, PG&E, and Tuscarora at the Oregon-California border. Instead, Pacific Connector would now connect to the existing GTN and Ruby supply pipelines within the newly proposed Klamath Compressor Station at MP 228.1.
Elements Added to or Modified for the Newly Proposed Pacific Connector Pipeline Project in Docket No. CP13-492-000		
Klamath Compressor Station	31 acres, at pipeline MP 228.1	41,000 hp of compression at the eastern beginning of the Pacific Connector pipeline.
Klamath-Eagle and Klamath-Beaver Meter Stations	Within Klamath Compressor Station tract	To interconnect with existing GTN and Ruby pipeline systems at MP 228.1.

TABLE 1.1.3-2

Major Differences Between the Original Pipeline Project Proposed in Docket No. CP07-441-000 and the Current Pacific Connector Project Proposed in Docket No. CP13-492-000

Element	Acres/Location a/	Reasons for the Changes
Elements Deleted or Modified from the Formerly Proposed Pacific Connector Pipeline Project in Docket No. CP07-441-000		
Clarks Branch Meter Station	1 acre, at newly proposed pipeline MP 71.5	Relocated because of route realignment for new crossing of I-5 and South Umpqua River between MPs 67.5 to 74.8.
Jordan Cove Meter Station	1 acre, at pipeline MP 1.5R	Relocated for new liquefaction project, adjacent to the South Dunes Power Plant.
17 MLVs	Total of about 2 acres outside of other proposed aboveground facilities, at MPs 1.5R, 15.7, 29.5, 48.4, 59.9, 71.5, 80.0, 94.7, 112.1, 122.2, 132,0, 150.7, 169.5, 187.4, 197.8, 214.3, and 228.1	MLVs relocated to account for realignments along pipeline route.
Major route realignments related to the (1) Brunschmid Wetland Reserve; (2) Weaver Ridge; (3) I-5 and Western South Umpqua River Crossings; and (4) McLoughlin Lane	MPs 9.4R to 12.4R; MPs 42.7 to 49.8; MPs 67.5 to 74.8; and MPs 187.4 to 191.1	See section 3.4

a/ Acres rounded to the nearest whole acre.

1.2 ENVIRONMENTAL SETTING

The Project is located in southwest Oregon. Jordan Cove's LNG terminal would be situated on the bay side of the North Spit of Coos Bay, near the coast of the Pacific Ocean, in Coos County, Oregon. LNG vessels would access the terminal through a waterway for LNG marine traffic, which is defined by the Coast Guard for the Project as extending from the outer limits of the U.S. territorial waters 12 nautical miles off the coast of Oregon, and up the Coos Bay navigation channel about 7.5 miles to the terminal.

The Pacific Connector pipeline would begin at the Klamath Falls Compressor Station and interconnections with Ruby and GTN near Malin in Klamath County, Oregon. The pipeline would generally trend northwest for about 232 miles to the Jordan Cove LNG terminal, crossing portions of Klamath, Jackson, Douglas, and Coos Counties, Oregon. The pipeline would traverse through the basin and range sage and juniper woodlands ecozone of the Klamath Basin, over the Southern Cascades conifer forest and oak woodlands and conifer forest ecozones of the Klamath Mountains, through Camas Valley and Douglas-fir forests of the Coastal Range, and terminate in the Coastal lowlands. Detailed descriptions of each ecozone crossed and environmental resources potentially affected by the Project are included in the respective sections of chapter 4 of this EIS.

1.3 PURPOSE AND NEED FOR THE PROPOSED PROJECT

The purpose and need for the proposed Project, as summarized below, was defined by Jordan Cove and Pacific Connector in their applications to the FERC. The Commission will more fully consider the need of this Project when making its decision on whether or not to authorize it, as documented in the Project Order.[14]

Under Section 3 of the NGA, the Commission considers as part of its decision to authorize natural gas facilities, all factors bearing on the public interest. Specifically, regarding whether to authorize natural gas facilities used for exportation, the Commission would authorize the

[14] The Commission's Order represents its record of decision.

proposal unless it finds the proposed facilities would not be consistent with the public interest. Under Section 7 of the NGA, the Commission determines whether interstate natural gas transportation facilities are in the public convenience and necessity and, if so, grants a Certificate to construct and operate them. The Commission bases its decision on technical competence, financing, rates, market demand, gas supply, environmental impact, long-term feasibility, and other issues concerning a proposed project.

According to Jordan Cove's application, the Project is a market-driven response to the increasing availability of competitively priced natural gas from western Canadian and Rocky Mountain sources, and robust international demand for natural gas. The newly proposed liquefaction terminal is designed to produce about 6 MMTPA (equivalent to about 0.9 Bcf/d of natural gas), and Jordan Cove intends to export that LNG by loading it onto vessels for overseas transport. Jordan Cove would like to be the first LNG export terminal to be approved, constructed, and operated on the West Coast of the continental United States, and thus positioned to mainly serve markets around the Pacific Rim. In addition to meeting Asian demand, Jordan Cove could serve American customers by exporting LNG to Alaska and Hawaii.

Jordan Cove could obtain natural gas for export as LNG from Canadian and Rocky Mountain sources via existing interstate transmission pipeline systems that are currently underutilized. According to a recent posting on TransCanada's GTN Pipeline website, there was nearly 1 Bcf/d of unused capacity at Malin at the end of 2013 (Nemec 2013). In February 2014, Canada's National Energy Board granted a 25-year license to Jordan Cove allowing for the export of up to 1.55 Bcf/d of natural gas to the United States.[15] On March 18, 2014, the DOE granted Jordan Cove with the authority to import from Canada up to 565.75 Bcf/year of natural gas.[16]

The purpose of the Pacific Connector Pipeline Project is two-fold: (1) to provide natural gas to the Jordan Cove LNG terminal; and (2) to supply additional volumes of natural gas to markets in southern Oregon. Pacific Connector can obtain supplies from Canadian and Rocky Mountain sources at the Malin hub, where North American natural gas would be competitively traded on a daily basis, through interconnections with GTN and Ruby at the proposed Klamath-Eagle and Klamath-Beaver Meter Stations. Pacific Connector intends to deliver about 40 million cubic feet of natural gas per day to Northwest's existing Grants Pass Lateral through an interconnect with the proposed Clarks Branch Meter Station. Jordan Cove needs Pacific Connector to supply firm transportation service of approximately 0.9 Bcf/d of natural gas for its LNG terminal.

Jordan Cove and Pacific Connector have entered into non-binding Heads of Agreements (HOA) with several prospective Asian customers for terminal and pipeline capacity, respectively. The HOAs indicate that pipeline precedent agreements would be executed by the end of 2014 for

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[15] See *Natural Gas Intelligence*, 3 March 2014, "Canada OKs Gas Exports to Supply Jordan Cove LNG Terminal." While the amount of Canadian export gas authorized by the National Energy Board exceeds the amount of gas that Jordan Cove requested for its liquefaction needs in its application to the FERC in Docket No. CP13-483-000, this is because Jordan Cove would like the option of being able to expand its terminal facilities in the future. However, Jordan Cove can only receive the amount of gas authorized by the Commission under this current proposal, and any future expansion would be subject to a new application, resulting in a new and separate environmental review of that expansion proposal by the FERC staff.

[16] See *Order Granting Long-Term Multi-Contract Authorization to Import Natural Gas From Canada to the Proposed Jordan Cove LNG Terminal in the Port of Coos Bay, Oregon* in FE Docket No. 13-141-NG (DOE/FE Order No. 3412). A copy of this Order was filed with the FERC on March 25, 2014, in Docket No. CP13-483-000.

those shippers that choose to make bidding commitments. Pacific Connector expects to hold an open season in the fall of 2014, upon the execution of binding precedent agreements with shippers with whom they are currently negotiating.[17]

The Jordan Cove Liquefaction Project and the Pacific Connector Pipeline Project are interconnected and dependent upon one another. Jordan Cove needs the Pacific Connector pipeline to provide it with natural gas that it can liquefy into LNG for export. Pacific Connector is dependent on Jordan Cove as the main destination for the natural gas to be transported through its pipeline for prospective foreign customers. This EIS recognizes this interdependency and analyzes the environmental impacts of both projects together as a single comprehensive enterprise.

1.4 PURPOSE AND SCOPE OF THIS ENVIRONMENTAL IMPACT STATEMENT

This EIS discloses and assesses the potential environmental impacts that are likely to result from the construction and operation of the JCE & PCGP Project. If significant environmental impacts are identified, the EIS describes measures that would be implemented to avoid, reduce, or mitigate those adverse effects. In addition to complying with the NEPA, our purposes for preparing this EIS include:

- a description and evaluation of reasonable alternatives to the proposed actions that would avoid or minimize adverse effects on the environment;
- the identification and assessment of the potential direct, indirect, and cumulative impacts on the natural and human environment that would result from implementation of the proposed actions;
- the identification and recommendations for specific mitigation measures, as necessary, to avoid or minimize significant environmental effects; and
- the involvement of the public, other agencies, and interested stakeholders in the environmental review process.

The topics addressed in this EIS include a description of the Project (chapter 2); alternatives (chapter 3); existing environment and impacts (chapter 4); and the FERC staff's conclusions and recommended mitigation measures (chapter 5). Chapter 4 is divided into sections by resource topic and includes land use (in section 4.1); geology, including hazards (section 4.2); soils and sediments (section 4.3); water resources and wetlands (section 4.4); upland vegetation and timber (section 4.5); wildlife and aquatic resources, including essential fish habitat (EFH) (section 4.6); threatened, endangered, and special status species (section 4.7); recreation and visual resources (section 4.8); socioeconomics (section 4.9); transportation (section 4.10); cultural resources (section 4.11); air quality and noise (section 4.12); reliability and safety (section 4.13); and cumulative impacts (section 4.14). This EIS describes the affected environment as it currently exists, discusses the environmental consequences of the Project, and compares the Project's potential impacts to the potential impacts of a reasonable range of alternatives. The information and analyses presented in this EIS are intended to support subsequent conclusions and decisions made by the Commission and the cooperating agencies.

[17] See the filing made with the FERC by Pacific Connector on May 15, 2014 in Docket No. CP13-492-000.

1.4.1 Purpose and Scope of the FERC's Action

The Commission has authority over the siting, construction, and operation of onshore LNG terminals, and pipelines engaged in the interstate transportation of natural gas. The FERC is the lead federal agency for the Project, and for the preparing of this EIS.

Our analysis in this EIS focuses on facilities and actions that are under the FERC's jurisdiction. However, this EIS also analyzes the potential environmental impacts resulting from non-jurisdictional connected actions, such as the construction and operation of the South Dunes Power Plant and the SORSC at the Jordan Cove terminal, and local utility lines to the Pacific Connector compressor station and meter station, because those facilities support the FERC jurisdictional facilities.

The Commission would consider the findings in this EIS during its review of Jordan Cove's and Pacific Connector's applications. The identification of environmental impacts related to the construction and operation of the Project, and the mitigation of those impacts, as disclosed in this EIS, would be components of the Commission's decision making process. The Commission would issue its decision in an Order. If the Project is approved, the Order would specify that the LNG terminal can be constructed and operated under the authority of Section 3 of the NGA, and a Certificate would be issued for the pipeline. The Commission may accept the applications in whole or in part, and can attach engineering and environmental conditions to the Order that would be enforceable actions to assure that the proper mitigation measures are implemented prior to the Project going into service.

1.4.2 Purpose and Scope of the Actions of the Forest Service, BLM, and Reclamation

The Forest Service, BLM, and Reclamation are cooperating with the FERC in the preparation of this EIS, which addresses impacts of the Pacific Connector Pipeline Project on lands administered by these agencies. The Pacific Connector pipeline route would cross portions of four BLM Districts (Coos Bay, Roseburg, and Medford Districts as well as the Klamath Falls Resource Area of the Lakeview District) and three National Forests (Umpqua, Rogue River, and Winema National Forests), as well as a portion of Reclamation's Klamath Basin Area (see figure 1.1-1). As cooperating agencies, the Forest Service and BLM anticipate adopting this EIS pursuant to 40 CFR 1506.3(c).

BLM land use planning requirements were established in Sections 201 and 202 of the Federal Land Policy and Management Act of 1976 (FLPMA, 43 United States Code [U.S.C.] 1711-1712) and the regulations in 43 CFR 1600. Forest Service land use planning requirements were established by the National Forest Management Act (NFMA) and the regulations in 36 CFR 219. These laws and regulations require a unit-specific LMP for each BLM administrative management unit (Resource Management Plans or RMPs) and National Forest (Land and Resource Management Plans or LRMPs).[18] All projects or activities on BLM land or within a National Forest must be consistent with the governing LMP.

Representatives of the Forest Service, BLM, and Reclamation have worked cooperatively with the FERC staff and Pacific Connector during pipeline route selection over federal lands and

[18] When referring to both the BLM RMPs and Forest Service and LRMPs collectively, this EIS will hereafter use the term "land management plans" or LMPs.

incorporation of best management practices (BMPs) to minimize environmental consequences. The BLM and Forest Service have determined that the linear nature of the Pacific Connector Pipeline Project would not be consistent with certain requirements of the LMPs of the BLM Districts and National Forests crossed. To address these inconsistencies, the BLM and Forest Service propose to amend the LMPs of the respective BLM Districts and National Forests to make provision for the Project. Although Reclamation's Klamath Basin Area is not subject to an LMP, the agency has also worked closely with the FERC staff and Pacific Connector to address issues related to the siting, construction, and operation of the pipeline where it would cross Reclamation lands and facilities that are part of Reclamation's Klamath Irrigation Project.

For the BLM and Forest Service, the primary purpose of this EIS is to consider and disclose the environmental consequences of construction and operation of the Pacific Connector pipeline on BLM and National Forest System (NFS) lands and to evaluate proposed LMP amendments. The Forest Service must also assess the significance of the proposed plan amendments with respect to the delivery of goods and services from the affected National Forests pursuant to 36 CFR 219.10(f) (1982 version). The BLM would utilize this EIS to consider Pacific Connector's right-of-way application and decide, with concurrence from the Forest Service and Reclamation, to grant, grant with conditions, or deny the Temporary Use Permit and the Right-of-Way Grant. The BLM and Forest Service are also using this EIS process to identify specific stipulations (including mitigation measures) related to resources within their respective jurisdictions for inclusion in the Right-of-Way Grant.

Both the BLM and Forest Service have identified suites of "Design Features" or "Project Requirements"[19] the agencies deem necessary to accomplish goals and objectives of their respective LMPs. These features/requirements include reallocation of land from the Matrix land allocation to the Late Successional Reserve (LSR) land allocation, placement of large woody debris (LWD), snag creation, stand density/fuels reduction, road resurfacing and decommissioning, culvert replacement, stream crossing repairs, invasive weed control, precommercial thinning, fire suppression facilities development, and meadow restoration. In addition, Pacific Connector would be required to acquire timber producing lands to replace those BLM Matrix lands proposed for reallocation to LSR by the BLM. The design features or requirements plans specific to the pipeline crossing of BLM and NFS lands each include a monitoring element to ensure that the wide array of actions are implemented and assess the effectiveness of the actions relative to the goals and objectives of the respective LMPs. These plans would be included in the Right-of-Way Grant, if the grant is approved, as attachments to Pacific Connector's Plan of Development (POD).[20] As an attachment to the POD, these plans are included in the description of the proposed action (sections 2.1.6 and 2.6 of this EIS). Reclamation has not identified measures specific to its lands or facilities beyond the procedures outlined in the POD, including Pacific Connector's *Klamath Project Facilities Crossing Plan*

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[19] The BLM and Forest Service use the term "Design Features" or "Project Requirements" rather than "mitigation" to describe elements of a plan that occur within a project area and are standard requirements of a project. The BLM and Forest Service reserve the term "mitigation" to describe measures taken to reduce or compensate for otherwise unavoidable impacts. The term "mitigation" as used elsewhere in this EIS refers to the full range of activities designed to reduce adverse effects of the Project.

[20] Pacific Connector filed its POD as a stand-alone document with the Environmental Report attached to its June 2013 application to the FERC

(Attachment 15 of the POD); and its *Winter Construction Plan for the Klamath Basin* (Appendix 1E attached to Resource Report 1 of Pacific Connector's application to the FERC).

Although these actions (which are described in the BLM and Forest Service plans; see chapter 2) are specific in terms of activity and location, this EIS addresses these in a programmatic fashion. Many of these actions may require additional analyses and surveys before final decisions can be made by the federal land managing agencies. The BLM and Forest Service anticipate that this EIS would provide the basis for tiering subsequent site-specific NEPA analyses, in accordance with the CEQ regulations at 40 CFR 1508.28(b). The BLM and Forest Service will conduct supplemental environmental analysis and consultation efforts with various federal, state, and local entities, as well as tribal governments, prior to authorizing future site-specific actions related to the design features or requirements for the Project.

The BLM Oregon State Director is the authorized officer for decisions related to amendments of the respective BLM LMPs, issuance of the Temporary Use Permit, and issuance of a Right-of-Way Grant, if authorized. The Forest Supervisor for the Umpqua National Forest is the authorized officer for decisions related to amendments of Forest Service LMPs and issuance of a concurrence letter to BLM, if warranted. The Responsible Official for Reclamation regarding concurrence on issuance of the Right-of-Way Grant is the Area Manager of Reclamation's Mid-Pacific Region Klamath Basin Area Office.

1.4.3 Purpose and Scope of the Actions of Other Federal Cooperating Agencies

1.4.3.1 Coast Guard

The Coast Guard is a cooperating agency for the production of this EIS, serving as a subject matter expert for, and providing recommendations on, the maritime safety and security aspects of, the Project. The Coast Guard does not issue a permit, license, order, or record of decision in this context, and is responsible for assessing the suitability of the waterway, and issuing a Waterway Suitability Report (WSR) and a Letter of Recommendation (LOR). The laws and regulations underpinning the Coast Guard review of this Project are further discussed below in section 1.5.3.1.

The Coast Guard is responsible for the safety and security of the waterway that LNG vessels would use to reach the Jordan Cove terminal. The recommendations of the Coast Guard that would make the waterway suitable for LNG marine traffic were contained in the WSR and LOR issued by the Captain of the Port (COTP).

Jordan Cove submitted a Waterway Suitability Assessment (WSA) to the Coast Guard for its original LNG import project in 2006. The Coast Guard issued a WSR on July 1, 2008, and provided an LOR on April 24, 2009, which are still considered valid. The Coast Guard stated in a February 21, 2012 response to a February 10, 2012 inquiry from Jordan Cove's consultant[21] that waterway impacts associated with export operations from Jordan Cove's terminal should be similar to those previously identified for the import proposal as outlined in Jordan Cove's original WSA, and as analyzed in the FERC's May 2009 FEIS for Docket No. CP07-444-000. However, the Coast Guard advised Jordan Cove to amend and update its Letter of Intent and Emergency Response Plan, and the WSA, for the export proposal, for Coast Guard review. Export operations should also be included in an amended

[21] This correspondence was attached to Appendix A.1 in Resource Report 1 of Jordan Cove's May 2013 application to the FERC in Docket No. CP13-483-000.

and updated Operations Manual and Facility Security Plan to be prepared by Jordan Cove. On December 28, 2012, Jordan Cove submitted its amended and updated Letter of Intent to the Coast Guard for the export project. Jordan Cove acknowledged in its annual review of the WSA (dated October 2012) that the terminal was to be used to export LNG and made appropriate corrections to the various sections of the WSA. On January 13, 2014, Jordan Cove forwarded its most recent annual review of the WSA to the Coast Guard, who responded on February 14, 2014, with the following statement: "we have no objection to your conclusion that the minor changes do not change the risk associated with the waterway or the facility as originally evaluated in your 2007 WSA." On February 27, 2014, the Coast Guard accepted the annual review of the WSA for the Jordan Cove Project. The WSA is considered Sensitive Security Information and is therefore not publicly releasable. Public documents related to the Coast Guard's determination can be found in appendix B of this EIS.

1.4.3.2 U.S. Army Corps of Engineers

The COE exerts regulatory authorities over waters of the United States pursuant to Section 10 of the Rivers and Harbors Act of 1899 (RHA), Section 404 of the Clean Water Act (CWA), and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). The laws and regulations underpinning the COE's actions are further discussed below in section 1.5.3.3.

The COE is a cooperating agency in the production of this EIS. The agency's purpose for participating in the development of the EIS is to streamline the Section 10 and Section 404 permitting process by working with the FERC to eliminate duplication of efforts. The EIS can reduce duplications of efforts in permit reviews for the Project by allowing the FERC to be the lead federal agency and fulfill obligations for compliance with a variety of federal environmental laws, including the NEPA, Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), Magnuson-Stevens Fishery Conservation and Management Act (MSA), Marine Mammal Protection Act (MMPA), and National Historic Preservation Act (NHPA), on behalf of the cooperating agencies, as further discussed in section 1.5. The COE intends to adopt the EIS for the purposes of exercising its regulatory authorities. On October 15, 2013, Jordan Cove and Pacific Connector submitted a single comprehensive Joint Permit Application (JPA) for the Project to the COE, to satisfy the requirements of Section 10 of the RHA and Section 404 of the CWA.[22] The COE indicated that it would use its standard individual permit review process, and would issue its own public notice of the JPA submitted by Jordan Cove and Pacific Connector; separate from the FERC's Notice of Intent (NOI) and our Notice of Availability (NOA) for the draft EIS (DEIS).[23]

1.4.3.3 U.S. Department of Energy

The DOE, a cooperating agency in the preparation of this EIS, may adopt this EIS to consider the environmental impacts associated with its decision whether to authorize the export of LNG, as proposed by Jordan Cove. The DOE must meet its obligations under Section 3 of the NGA, to authorize the import and export of natural gas, including LNG, unless it finds that the proposed import or export would not be consistent with the public interest. The purpose and need for the DOE action is to respond to the applications filed by Jordan Cove with the DOE. In accordance

[22] A copy of the JPA was filed with the FERC on November 6, 2013, replacing Appendix G.2 of Resource Report 2 in Jordan Cove's May 21, 2013, application to the FERC.
[23] This was articulated in a September 11, 2013, letter to the FERC from the COE Eugene Field Office.

with 40 CFR 1506.3, after an independent review of the FERC's EIS, the DOE may adopt it prior to issuing its ROD.

On September 22, 2011, Jordan Cove filed an application with the DOE seeking authorization to export up to 1.2 Bcf/d of natural gas converted to LNG from its proposed terminal at Coos Bay, Oregon to FTA nations.[24] The DOE issued its *Order Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel from the Jordan Cove LNG Terminal to Free Trade Agreement Nations* on December 7, 2011, in DOE/FE Docket No. 11-127-LNG (DOE/FE Order No. 3041).

On March 23, 2012, Jordan Cove filed an application with the DOE, in FE Docket No. 12-32-LNG, seeking authorization to export LNG to non-FTA nations. DOE issued its *Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas by Vessel From the Jordan Cove LNG Terminal in Coos Bay, Oregon to Non-Free Trade Agreement Nations* (DOE/FE Order No. 3413) on March 24, 2014. This Order would allow Jordan Cove to export up to 6 MMTPA of LNG (equivalent to 292 Bcf/year of natural gas) for 20 years after either the first shipment or seven years after the date of the Order. The LNG may be exported to any country with which the United States does not have a FTA, which currently has or in the future could develop the capacity to import LNG, and with whom trade is not prohibited. The authorization is conditioned on the completion of the environmental review process to comply with the NEPA, and Jordan Cove must also comply with the mitigation measures required by federal and state agencies for the Project. In addition, Jordan Cove must file with the DOE copies of long-term contracts for both natural gas supply and the export of LNG.

Because the Project may involve actions in floodplains, in accordance with 10 CFR Part 1022, *Compliance with Floodplain and Wetland Environmental Review Requirements,* this EIS includes a floodplain assessment. A floodplain statement of findings would be included in any DOE determinations. Section 4.4 of this EIS discusses elements of the Project that may be within floodplains, so that the FERC, as lead federal agency, can document compliance with Executive Order (EO) 11988.[25]

1.4.3.4 U.S. Environmental Protection Agency

The EPA is a cooperating agency in the production of this EIS. The EPA has responsibilities under the NEPA, Clean Air Act (CAA), CWA, and MPRSA (see section 1.5.3.4 of this EIS). The EPA shares responsibility for administering and enforcing Section 404 of the CWA with the COE, and has authority to veto COE permit decisions.

The EPA also co-administers the MPRSA with the COE. Section 103 of the MPRSA authorizes the COE to issue permits for the ocean disposal of dredged material. That permit decision would be made using the EPA's environmental criteria, and subject to EPA's concurrence. If disposal

[24] DOE/FE Docket No. 11-127-LNG, a copy of which was filed with the FERC by Jordan Cove in Docket No. CP13-483-000 on September 23, 2011.

[25] EO 11988, *Floodplain Management*, requires federal agencies to avoid adverse impacts associated with the occupancy and modification of floodplains, and to avoid floodplain development wherever there is a practicable alternative. The objectives of the EO include the minimization of impacts from floods resulting from agency actions, and the preservation of floodplains where possible.

is proposed at an EPA-designated site under Section 102 of the MPRSA, that disposal must be consistent with that site's Site Management and Monitoring Plan.

In addition, Section 309 of the CAA directs the EPA to review and comment in writing on the environmental impact associated with all major federal actions. This obligation is independent of its role as a cooperating agency under the NEPA regulations. Consistent with this direction, EPA evaluates all federally issued EISs for adequacy in meeting the procedural and public disclosure requirements of the NEPA.

1.4.3.5 U.S. Department of Transportation

The DOT is a cooperating agency in the production of this EIS. The DOT has authority to enforce safety regulations and design standards for the LNG terminal (see section 4.13.10 of this EIS), as well as safety regulations and standards related to the design, construction and operation of natural gas pipelines, under the Natural Gas Pipeline Safety Act (49 U.S.C. 1671 et seq.). In a June 18, 2014, letter to the FERC, PHMSA stated that it had reviewed the criteria used by Jordan Cove in identifying credible leakage scenarios and establishing the siting for the LNG terminal to confirm compliance with 49 CFR 193, and had no objections to Jordan Cove's methodologies.[26] The DOT would also monitor the construction and operation of the natural gas facilities to determine compliance with its design and safety standards.

1.4.4 Issues Considered Outside the Scope of this EIS

During the pre-filing public scoping period (see section 1.6 below), some citizens and organizations raised issues that are considered outside the scope of this EIS. Those issues will not be addressed in this EIS, because we do not consider them to be environmental in nature. Examples of out-of-scope issues include the need to export LNG; horizontal hydraulic drilling through shale formations during exploration for natural gas (often referred to as "fracking"); induced production of natural gas; "life-cycle" cumulative environmental impacts associated with the entire LNG export process; the concept of a "programmatic" EIS to cover LNG export terminals throughout the United States; and administrative information technology system operations at the FERC.

With regard to the public benefit or need to export LNG from the United States to foreign nations, that decision rests with the DOE, and is therefore outside of the jurisdiction of the FERC. The Commission explained the background behind the different authorities that the United States Congress has assigned to the FERC in comparison to the DOE in its *Order Granting Section 3 Authorization* to Sabine Pass Liquefaction LLC issued on April 16, 2012, in Docket No. CP11-72-000.[27] While the Commission has the authority to site and approve or disapprove the construction and operation of onshore LNG terminals, the DOE retains the ability to approve or disprove the import or export of the commodity itself. In the case of the Jordan Cove Project, the DOE granted authority to export LNG to FTA nations in December 2011 and to non-FTA nations in March 2014.

Neither does the FERC have any authority over activities related to the exploration, production, and gathering of natural gas in the United States or Canada. Those activities, in the United

[26] This letter was filed in the FERC public record under Docket No. CP13-483-000 on June 19, 2014.
[27] 139 FERC § 61,039 (2012), III, pages 9-12.

States, would be regulated by individual states. Pacific Connector can obtain natural gas from Canadian and Rocky Mountain supplies at the Malin hub, through interconnections with GTN and Ruby. However, there is no reasonable way to determine the exact sources of the natural gas transported in the GTN and Ruby pipelines; nor is there a reasonable way to identify the well-specific exploration and production methods used to obtain those gas supplies.[28]

Some commenters claim that the export of LNG from the Jordan Cove terminal would result in the indirect impact of inducing additional drilling activities or stimulating natural gas production in the United States.[29] The Commission has previously taken the position that it is virtually impossible to estimate export volumes that may come from future shale natural gas production, and that the number and location of future natural gas wells is unknowable at this time. The Project does not depend on additional United States production, because much of the gas may come from Canadian sources, and existing transmission pipelines in the western states are underutilized. It is speculative to assume that the Jordan Cove export proposal would cause increased natural gas production because other factors, unrelated to the Project, over which the Commission has no control, such as regional domestic market demands, permitting for new gas wells, or technologies and efficiencies in exploration, may also influence production. Therefore, induced or additional natural gas production is not a "reasonably foreseeable" indirect effect of the Project, and is not addressed in this NEPA document.[30]

The "life-cycle" cumulative environmental impacts, from exploration, production, and gathering of natural gas; transportation to Pacific Connector; and shipment of LNG overseas from the Jordan Cove terminal are far beyond the jurisdictional authority of the FERC or the activities directly related to the Project.[31] Nor can those impacts be easily or reasonably calculated, given the number of unknown elements in the chain, and actions by entities other than Pacific Connector and Jordan Cove. As mentioned above, the number and location of wells producing natural gas in Western Canada and the Rocky Mountain regions are unknown, as are the gathering systems that would ultimately transport that gas to GTN and Ruby. Jordan Cove has not identified the specific vessels that would ship the LNG abroad or the exact customers for the LNG. Without knowing the final destination of the LNG, it would not be possible to calculate the environmental impacts associated with its overseas shipping.[32]

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[28] The Commission addressed this issue in its *Order Granting Section 3 Authorization* to Sabine in Docket No. CP11-72-000 (139 FERC § 61,039 [2012], IV, pages 31-33), and also in *Central New York Oil and Gas Company* (137 FERC § 61,121 [2011], page 98).

[29] Letters to the FERC from the EPA dated October 29, 2012, and the Sierra Club on June 21, 2013.

[30] This issue was also discussed in Jordan Cove's Answer to Motions to Intervene, pages 6-7, filed on July 3, 2013 in Docket No. CP13-483-000, and Combined Answers of LNG Development Company and Oregon Pipeline Company, pages 4-10, filed on August 26, 2013 in Docket Nos. CP09-6-001 and CP09-7-001. They cite *Cheniere Creole Trail Pipeline*, 142 FERC § 61,137 (2013), page 19, and *Sabine Pass Liquefaction*, 140 FERC § 61,076 (2012), pages 9-10.

[31] According to former FERC Chairman Jon Wellinghoff, there is no legal basis for the FERC to consider the cumulative environmental impacts of shale gas drilling activities when reviewing a proposed LNG export terminal. On January 10, 2014, Mr. Wellinghoff was quoted in the industry press as saying: "The FERC does not have the statutory authority to look at impacts all the way back to the wellhead."

[32] The Commission's September 18, 2008 *Order Granting Authority Under Section 3 of the Natural Gas Act and Issuing Certificates* for the proposed Bradwood Landing LNG import project in Docket No. CP06-365-000 (124 FERC § 61,257 [2008], Section D, pages 25-26) indicated that different studies of life-cycle greenhouse gas emissions for imported LNG, including long distance ship transport, came up with conflicting figures and

In the recent past, the Commission has not produced any "programmatic" environmental studies for natural gas projects. The Commission does not intend to conduct a nation-wide analysis of proposed LNG export terminals. As stated above, it is the DOE that determines the public benefits of exporting LNG from terminals in the United States. The FERC's review and approval of individual projects under the NGA does not constitute a coordinated federal program. In a previous case, the Commission stated that it "does not direct the development of the gas industry's infrastructure, either on a broad regional basis, or in the design of specific projects."[33] As articulated in the September 18, 2008, Commission Order for the Bradwood LNG import project in Docket No. CP06-365-000, the FERC does not engage in regional planning exercises that would result in the selection of one terminal location over another.[34] Instead, it is the Commission's historic policy to allow market forces to influence where LNG terminals should be situated; assuming that the locations are environmentally acceptable based on the analysis contained in a project-specific EIS. Companies select the location of their proposed facilities based on market and other factors, and the Commission staff analyzes the environmental impacts of construction and operation of those facilities at the selected locations. Companies would be at risk for the costs of constructing and operating an LNG terminal, as influenced by their own research into economic conditions and market needs.

There were also some comments on administrative issues raised during pre-filing scoping that are not environmental topics and will not be addressed in this EIS. Those comments were mainly about the FERC's information management system, including eComment. Those issues are outside the scope of this EIS.

1.5 PERMITS, APPROVALS, AND CONSULTATIONS

1.5.1 Other Federal Environmental Laws

Besides the NGA, EPAct, and the NEPA, the FERC and cooperating agencies are required to comply with other federal laws that involve consideration of the Project's potential impact on a range of environmental resources. This includes compliance with the ESA, MSA, MMPA, MBTA, and the NHPA. As the lead federal agency for the JCE & PCGP Project, the FERC has undertaken the lead role for consultations under these statutes for itself and on behalf of the cooperating agencies. The status of compliance with those acts is described in this EIS.

There are other federal agencies that must be consulted, or would issue permits or approvals based on these federal environmental laws, before this Project could be constructed. For example, the FWS must be consulted regarding compliance with the ESA and MBTA, and the U.S. Department of Commerce National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) must be consulted regarding compliance with the ESA, MSA, and MMPA. In order to comply with Section 106 of the NHPA, the FERC must afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking.

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conclusions. A recent study for the DOE by the National Energy Technology Laboratory (NETL 2014) estimated the 20-year global warming potential of life cycle GHG emissions of exporting LNG from New Orleans, Louisiana to Shanghai, China to use as fuel to burn in an electric power plant would be 824 kgCO2e/MWh, which is lower than using coal from China or natural gas transported by pipeline from Yamal, Russia; however, NETL did not model exporting LNG from the West Coast of the United States to Asian markets.

[33] See *Texas Eastern Transmission, LP & Algonquin Gas Transmission, LLC* (2012) 141 FERC § 61,043, page 25.

[34] 124 FERC § 61,257, Section D, pages 29-30.

Other federal laws or regulations that require permits and approvals before this Project could be constructed include compliance with the RHA, CWA, CAA, Coastal Zone Management Act (CZMA), and Coast Guard regulations relating to LNG waterfront facilities. Some of these federal permits or approvals, such as Section 401 of the CWA, CAA, and CZMA, have been delegated to state agencies, as discussed below. For example, the ODEQ has been delegated CWA 401 and 402 responsibilities under the CWA and CAA, and the Oregon Department of Land Conservation and Development (ODLCD) has delegated responsibilities under the CZMA.

In accordance with Section 313(d) of the EPAct, the FERC is required to keep a complete consolidated record of all actions or decisions made by agencies undertaking federal authorizations. On October 19, 2006, in Order No. 687, the FERC issued implementing regulations regarding the maintenance of a consolidated record. Section 313(c) of the EPAct requires that the FERC establish a schedule for federal authorizations. Pursuant to Order No. 687, the FERC issued an initial Notice of Schedule for *Environmental Review of the Jordan Cove Liquefaction and Pacific Connector Pipeline Projects* on July 16, 2014. That notice stated that the FERC's target goal for producing the FEIS for the Project would be February 27, 2015, with the 90-day deadline for other federal authorizations projected to be May 28, 2015.

While the EPAct amended the NGA to give exclusive authority to the FERC to approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal, it specified that nothing in the Act was intended to overrule other federal authorities. This includes the protection of the rights of states with federally delegated responsibilities under the CZMA, CAA, and CWA.

Table 1.5.1-1 lists the major federal, state, and local permits, approvals, and consultations identified for the Project.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
FEDERAL			
Federal Energy Regulatory Commission (FERC)	Sections 3 and 7 of the Natural Gas Act (NGA) [Title 15 United States Code [U.S.C.] 717] Section 311 of the Energy Policy Act of 2005 (EPAct) Title 18 Code of Federal Regulations (CFR) 153, 157, 375, and 385	Order Granting Section 3 Authorization and Issuing Certificate of Public Convenience and Necessity.	On May 21, 2013, Jordan Cove filed an application with the FERC under Section 3 of the NGA. On June 6, 2013, Pacific Connector filed an application with the FERC under Section 7 of the NGA. The FERC's decision is pending until after the FEIS is issued.
	Order No. 687 National Environmental Policy Act (NEPA) 42 U.S.C. 4321 et seq. 40 CFR 1500-1508 18 CFR 380.12	Produce Environmental Impact Statement (EIS).	On August 2, 2012, the FERC issued Notice of Intent (NOI) to Prepare an EIS. On July 16, 2014, the FERC issued its Notice of Schedule for Environmental Review with a projected FEIS date of February 27, 2015.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
Advisory Council on Historic Preservation (ACHP)	Section 106 of the National Historic Preservation Act (NHPA) 16 U.S.C. 470 36 CFR 800	Opportunity to comment on the undertaking.	On August 30, 2011, the FERC submitted its Memorandum of Agreement (MOA) to the ACHP for original Pacific Connector project in Docket No. CP07-441-000. If the newly proposed Pacific Connector Project (Docket No. CP13-492-000) is authorized by the FERC, the MOA would be amended.
Federal Communication Commission	License for fixed microwave stations and service 47 U.S.C. 303 47 CFR 101	Review proposals for new or additions to existing communication towers.	Pending.
U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)	Farmland Protection Policy Act 7 U.S.C. 4201-4209 7 CFR Part 658	Determine if the Project would result in the permanent conversion of prime farmland.	On August 30, 2012, the NRCS commented on the FERC's NOI. NRCS comments on impacts on prime farmland pending review of EIS.
USDA Forest Service (Forest Service)	Mineral Leasing Act (MLA) 30 U.S.C. 181 et seq. 43 CFR 2882	Concur with Right-of-Way (ROW) Grant.	On April 17, 2006, Pacific Connector submitted its initial SF 299 ROW Grant application. On February 25, 2013, Pacific Connector amended that application. Decision on ROW Grant pending until after issuance of FEIS.
	36 CFR 219.17	Amend Land and Resource Management Plans (LRMP).	On September 21, 2012, Forest Service and BLM issued a Supplemental NOI. Amendments pending review of EIS.
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS)	Section 7 of the Endangered Species Act (ESA) 16 U.S.C. 1531 et seq. 50 CFR 222 50 CFR 224 50 CFR 402	Provide a biological opinion (BO) if the Project is likely to adversely affect federally listed threatened or endangered aquatic species or their habitat.	Concurrent with issuance of draft EIS (DEIS), the FERC would submit its biological assessment (BA) and essential fish habitat (EFH) assessment to the NMFS. The NMFS would issue its BO pending review of the FERC's BA and EFH Assessment.
	Marine Mammal Protection Act (MMPA) 16 U.S.C. 1361 et. seq. 50 CFR 82 50 CFR 216	Consult on protected marine mammals.	On October 8, 2014, Jordan Cove and Pacific Connector submitted their draft application for incidental harassment authorization to the NMFS. Review pending.
	Magnuson-Stevens Fishery Conservation and Management Act (MSA) 16 U.S.C. 1801-1884 50 CFR 600	Provide conservation recommendations if the Project would adversely impact EFH.	Pending review of the FERC's EFH Assessment.
U.S. Department of Defense (DOD)	Section 311(f) of the EPAct and Section 3 of the NGA 15 U.S.C. 717b 18 CFR 153, 157, 375, and 385 MOU between FERC and DOD	Consult with the Secretary of Defense to determine whether an LNG facility would affect the training or activities of an active military installation.	On September 27, 2012, the FERC sent a letter about the Project to the DOD Siting Clearinghouse. On November 2, 2012, the DOD replied that the Project would have minimal impact on military operations in the area.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
U.S. Department of the Army, Corps of Engineers (COE)	Section 10 of the Rivers and Harbors Act (RHA) 33 U.S.C. 403 33 CFR 320 to 330	Process permit application for structures or work in or affecting navigable waters of the United States.	On June 13, 2013, and July 8, 2013 Jordan Cove and Pacific Connector respectively submitted separate Joint Permit Applications (JPA) with the COE. On August 15, 2013, COE requested that a single comprehensive JPA be resubmitted for the complete Project. On October 15, 2013, Jordan Cove and Pacific Connector submitted a single comprehensive JPA. Permit pending review of JPA.
	Section 404 of the Clean Water Act (CWA) 33 U.S.C. 1344 33 CFR 320 to 330	Process permit application for the placement of dredged or fill material into waters of the United States.	On June 13, 2013, and July 8, 2013 Jordan Cove and Pacific Connector respectively submitted separate JPAs with the COE. On August 15, 2013, COE requested that a single comprehensive JPA be resubmitted for the complete Project. On October 15, 2013, Jordan Cove and Pacific Connector submitted a single comprehensive JPA. Permit pending review of JPA. Between March 2013 and March 2014, Jordan Cove submitted various wetland delineation reports to the COE. On March 13, 2014, the COE concurred with the boundaries and extent of Waters of the U.S. depicted in the Jordan Cove wetland delineation report. On June 26, 2013, Pacific Connector submitted its wetland delineation report to the COE. On August 5, 2014, the COE concurred with the boundaries and extent of Waters of the U.S. depicted in the Pacific Connector wetland delineation report.
	Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) 33 U.S.C. 1401 et. seq. 33 CFR Part 324	Issue a permit for the ocean disposal of dredged material under MPRSA consistent with EPA criteria and subject to EPA concurrence.	Jordan Cove included a dredged material management plan with its JPA to the COE. Permit pending review of JPA.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
U.S. Department of Energy (DOE) Office of Fossil Energy	Section 3 of the NGA 15 U.S.C.§717b 18 CFR 153, 157, 375, and 385	Authority to export LNG to Free Trade Agreement (FTA) Nations.	On September 22, 2011, Jordan Cove filed an application with the DOE in FE Docket No. 11-127-LNG. On December 7, 2011, DOE issued DOE/FE Order No. 3041 granting authority for Jordan Cove.to export LNG to FTA Nations.
	Section 3 of the NGA 15 U.S.C.§717b 18 CFR 153, 157, 375, and 385	Authority to export LNG to Non-FTA Nations.	On March 23, 2012, Jordan Cove filed an application with the DOE in FE Docket No. 12-32-LNG. On March 24, 2014, DOE issued DOE/FE Order No. 3413 granting authority for Jordan Cove.to export LNG to non-FTA Nations.
DOE, Bonneville Power Administration (BPA)	Encroachment permit for electric transmission line crossings	Permit review.	Decision Pending.
U.S. Environmental Protection Agency (EPA)	Section 404 of the CWA 33 U.S.C. 1412 40 CFR 227, 228	Co-administers CWA 404 program with the COE. EPA retains veto authority for wetland permits issued by the COE.	On October 29, 2012, EPA commented on the FERC's NOI. Review pending issuance of COE permit.
	Section 103 of the MPRSA 33 U.S.C. 1344, and 40 CFR Part 230	COE issues a permit for the ocean disposal of dredged material under MPRSA consistent with EPA criteria. The permit is subject to EPA concurrence if disposal is proposed at an EPA ocean dredged material disposal site designated under Section 102 of the MPRSA.	Jordan Cove included a dredged material management plan with its JPA to the COE. EPA concurrence pending issuance of permit by COE.
	Section 309 of the Clean Air Act (CAA) 42 U.S.C. 7401 et seq. 40 CFR 1503.1(a)	Reviews and evaluates EIS for adequacy in meeting the procedural and public disclosure requirements of the NEPA.	Review of EIS pending.
U.S. Department of Homeland Security, Coast Guard	Ports and Waterway Safety Act 33 U.S.C. 1221 33 U.S.C. 1231 33 CFR 160 33 CFR 127	Captain of the Port (COTP) issues a Letter of Recommendation (LOR) and Waterway Suitability Report (WSR) recommending the suitability of the waterway for LNG marine traffic.	On July 1, 2008, COTP issued a WSR. On April 24, 2009, the Coast Guard issued an LOR.
		Review Emergency Manual.	On June 25, 2010, Coast Guard reviewed document and marked it "Examined."
		Review Operations Manual.	Pending. Must be completed prior to receiving first LNG vessel.
	33 CFR 165	Establish safety and security zones for LNG vessels in transit and while docked.	On May 17, 2011, Security Zone noticed in 76 FR 28317.
	Maritime Transportation Security Act 46 U.S.C. 701 33 CFR 105	Review and Approve Facility Security Plan.	Pending. Must be completed 60 days prior to receiving first LNG vessel at the facility

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
	Navigation and Vessel Inspection Circular – Guidance related to Waterfront Liquefied Natural Gas (LNG) Facilities NVIC 05-05 NVIC 05-08 NVIC 01-11	Develop LNG Vessel Transit Management Plan.	Pending. Must be completed prior to receiving first LNG vessel.
		Validate WSA and produce WSR.	On July 1, 2008, the Coast Guard issued a WSR for original LNG import project. On February 21, 2012, the Coast Guard acknowledged validity of the current WSR when the facility changed from import to export. The WSA was updated as part of Jordan Cove's annual review in October 2012 and was updated to change the proposed terminal from import to export. On January 13, 2014, Jordan Cove submitted its most recent annual review of the WSA to the COTP. On February 24, 2014, COTP stated that the risk associated with the waterway and facility has not changed since the Project was originally evaluated.
U.S. Department of the Interior (USDOI), Bureau of Land Management (BLM)	Section 28 of Mineral Leasing Act of 1920 (MLA) 30 U.S.C. 181 43 CFR 2880	Issue ROW Grant for crossing federal lands.	On April 17, 2006, Pacific Connector submitted its initial SF 299 ROW Grant application. On February 25, 2013, Pacific Connector amended that application.
	Federal Land Policy and Management Act of 1976, as amended 43 CFR 1610	Resource Management Plan Amendments.	On September 21, 2012, BLM and Forest Service issued a Supplemental NOI. Decision pending review of EIS.
USDOI Bureau of Reclamation	MLA 30 U.S.C. 181 et seq. 43 CFR 288.23(i)	Concur with issuance of the ROW Grant	On April 17, 2006, Pacific Connector submitted its initial SF 299 ROW Grant application. On February 25, 2013, Pacific Connector amended that application.
USDOI Fish and Wildlife Service (FWS)	Section 7 of the ESA 16 U.S.C. 153 et seq. 50 CFR 402.02	Provide a BO if the project is likely to adversely affect terrestrial federally-listed threatened and endangered species or their habitat.	On September 4, 2012, FWS commented on FERC's NOI. Concurrent with issuance of DEIS, the FERC would submit its BA to FWS.FWS would issue its BO pending review of the FERC's BA.
	Fish and Wildlife Coordination Act (FWCA) 16 U.S.C. 661-667(d) 23 CFR Part 773	Provide comments to prevent loss of and damage to wildlife resources.	FWS generally addresses FWCA issues via comments on FERC NEPA and COE 404 permit processes.
	Migratory Bird Treaty Act (MBTA) 16 U.S.C. 703 Executive Order 13186	Consultation regarding compliance with the MBTA.	Pending review of this EIS and review of applicants' Migratory Bird Conservation Plan.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
U.S. Department of Transportation (DOT), Pipeline and Hazardous Materials Safety Administration (PHMSA)	Natural Gas Pipeline Safety Act (NGPS) 49 U.S.C. 601 49 CFR Parts 190-199	Administer national regulatory program to ensure the safe transportation of natural gas.	On September 19, 2013, Jordan Cove submitted to PHMSA data related to the analysis of a potential LNG leak source. On June 18, 2014, PHMSA stated it had no objections to Jordan Cove's methodologies for identifying credible leakage scenarios in siting its LNG terminal.
DOT, Federal Aviation Administration (FAA)	18 CFR Subchapter E Federal Aviation Regulations (FAR) Part 77 IAW FAA Order 7400.2G, 6-1-6	Aeronautical Study of Objects Affecting Navigable Airspace. Feasibility Study for Hazard Determination.	On May 8, 2007, the FAA issued an aeronautical study for the communication tower at the Jordan Cove Meter Station proposed under Docket No. CP07-444-000. On November 1, 2008, the FAA issued a limited aeronautical review of the LNG tanks proposed in Docket No. CP07-444-000. Continuing consultations with FAA are pending.
U.S. Department of the Treasury, Bureau of Alcohol, Tobacco, and Firearms	Explosives User Permit 27 CFR 555	Issue permit to purchase, store, and use explosives during project construction.	Permits to be obtained by Jordan Cove and Pacific Connector, as necessary, before construction.
STATE – OREGON			
Oregon Department of Agriculture (ODA)	Oregon Endangered Species Act Oregon Senate Bill 533 and Oregon Revised Statute (ORS) 564	Consult on Oregon listed plant species, and ODA would review botanical survey reports covering non-federal public lands prior to ground-disturbing activities where state listed botanical species are likely to occur.	On September 15, 2008, ODA informed Jordan Cove that it was in compliance with state laws, and no species should be adversely affected. On July 24, 2006, ODA provided Pacific Connector with a list of state listed species. In September 2007 and November 2008 Pacific Connector submitted botanical survey reports to ODA. ODA's review of these botanical reports is pending.
Oregon Department of Energy (ODE)	State Authorities under Section 311 of the EPAct	Furnish an advisory report on state safety and security issues to the FERC regarding the Jordan Cove LNG Terminal proposal, and conduct operational safety inspections if the facility is approved and built.	On October 29, 2012, ODE filed environmental comments as part of the State of Oregon's response to the FERC's NOI issued August 2, 2012. On June 20, 2013, ODE filed a motion to intervene in response to the FERC's Notice of Application (NOA) issued May 30, 2013. ODE did not submit a State Safety Report to the FERC within 30 days of the NOA. On June 14, 2014, ODE entered into an MOU with Jordan Cove regarding LNG emergency preparedness at the export terminal. Safety inspections pending operation of facilities.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
ODE – Energy Facility Siting Council (EFSC)	Oregon State Siting Standards ORS 469.300 Oregon Administrative Rule (OAR) 345	Authority to review proposals for power plants generating more than 25 MW and issue a Site Certificate.	On November 30, 2012, Jordan Cove filed amended Notice of Intent for the South Dunes Power Plant. On February 14, 2013, EFSC issued Project Order. Site Certificate Pending.
	OAR 345-21 & 22	Enforce Oregon's CO_2 Standards. Enforce Oregon's Retirement Bond Requirements.	On June 10, 2014, ODE entered into a Memorandum of Understanding (MOU) with Jordan Cove regarding CO_2 and Facilities Retirement.
Oregon Department of Environmental Quality (ODEQ)	Water Quality Certification Section 401 of the CWA ORS 468B OAR 340-48	Issue a license or permit to achieve compliance with state water quality standards.	Pacific Connector submitted water quality information to ODEQ concurrent with its JPA to the COE. Review pending.
	Section 402 of CWA ORS 468B OAR 340-45	Issue National Pollutant Discharge Elimination System (NPDES) permits for discharge of stormwater.	On July 22, 2014, Jordan Cove submitted its modified NPDES permit application to ODEQ. Review pending. One year prior to construction, Pacific Connector intends to submit its NPDES permit applications to ODEQ.
	Ballast Water Management ORS 620-992 OAR 340-143	Review liabilities and offences connected to shipping and navigation.	Pending review of this EIS.
	CAA – Title V 40 CFR 98 ORS 468A OAR 340-215, 216, 218, 222, & 228	Issue Title V Air Quality Operating permit. Issue Title V Acid Rain permit. Enforce Greenhouse Gas (GHG) Reporting Requirements.	In March 2013, Jordan Cove submitted an air quality permit application to the ODEQ. Pacific Connector anticipates submitting an air quality permit application to ODEQ in 2014. GHG analysis pending review of this EIS.
	Prevention of Significant Deterioration CAA ORS 468B OAR 340-224 & 225	Review Best Available Control Technologies to minimize discharges from new major sources, and review air quality analyses to ensure compliance with National Ambient Air Quality Standards.	In March 2013, Jordan Cove submitted an air quality permit application to the ODEQ. Pacific Connector anticipates submitting an air quality permit application to ODEQ in 2014. Pending review of this EIS.
	Hazardous Waste Activity ORS 466 OAR 340-102	Review plans for storage and management of hazardous waste	Pending review of this EIS.
Oregon Department of Fish and Wildlife (ODFW)	Fish and Wildlife Coordination Act and the Oregon Endangered Species Act under ORS 496, 506, and 509 OAR 635	Consult on sensitive species and habitats that may be affected by the Project and, in general, regarding conservation of fish and wildlife resources.	In June 2014, Jordan Cove produced its latest revision of its Wildlife Habitat Mitigation Plan. ODFW Review pending. Pacific Connector has not yet submitted its Wildlife Habitat Mitigation Plan to ODFW.
	Fish and Wildlife OAR 345-22 & 60	Consult on and approve fish and wildlife mitigation plan.	On January 29, 2014, Jordan Cove submitted its Draft Wildlife Salvage Plan to ODFW. Review pending.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
	Fish Screening Criteria at Stream Crossings OrS 509-580 through 910 OAR 635-412-5 through 40	Review stream crossing plans for consistency with Oregon fish passage law and ODFW fish passage rules	Pacific Connector submitted its Fish Passage Waiver Application and Fish Passage Plan for Road and Stream Crossings. ODFW review pending.
	ORS 509-140, et al.	Consider issuance of in-water blasting permits.	Pacific Connector submitted In-Water Blasting Permit Application. ODFW review pending.
Oregon Department of Forestry (ODF)	Easement on State lands Oregon Forest Practices Act OAR 629 ORS 477 ORS 527	Management of State Forest lands for Greatest Permanent Value, develops Forest Management Plans, stewardship under State's Land Management Classification System, monitors harvests of timber on private lands, and protects non-federal public and private lands from wildfires.	Pacific Connector anticipates submittal of final plans to ODF during the first quarter of 2015.
Oregon Department of Geology and Mineral Industries (DOGAMI)	Building Code Section 1802.1 ORS 455-446 OAR 517	Review of structural designs in tsunami zones. Review of geotechnical investigations for geological hazards. Review of mining and reclamation activities.	Review and decision pending.
State Historic Preservation Office (SHPO)	Section 106 of the NHPA 36 CFR 800 ORS 338-920	Review cultural resources reports and comments on recommendations for National Register of Historic Places eligibility and project effects. Issue permits for excavation of archaeological sites on non-federal lands.	On June 3, 2011, the Oregon SHPO signed the FERC's MOA for the original Pacific Connector project in Docket No. CP07-441-000. If the FERC authorizes the newly proposed Pacific Connector Project (in Docket CP13-492-000) the MOA would be amended. SHPO review of future cultural resources investigations reports pending.
Oregon Department of Land Conservation and Development (ODLCD)	Coast Zone Management Act (CZMA) 15 CFR Part 930 ORS 196.435	Determine consistency with CZMA program policies.	On August 1, 2014, Jordan Cove and Pacific Connector submitted their applications for Certification of Consistency to the ODLCD. The six-month review period regarding federal consistency provisions of the CZMA began on August 1, 2014 and will end on February 1, 2015.
Oregon Department of State Lands (ODSL)	Submerged and Submersible Land Easement OAR 141-122	Grant submerged land easements.	On May 15, 2014, Pacific Connector submitted its easement Application. ODSL Review pending.
	Joint Removal-Fill Law ORS 196-795-990 OAR 141-85	Approve removal or fill of material in waters of the state.	On February 19, 2013, ODSL issued Amended Proposed Order allowing dredging of Jordan Cove access channel and slip. On December 2, 2013, ODSL found Pacific Connector's application to be complete.
	Compensatory Wetland Mitigation Rules OAR 141-85-121	Review and approve wetland mitigation plans.	On July 15, 2013, Pacific Connector filed an application with ODSL. Decision Pending.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
Oregon Department of Transportation (ODOT)	Section 303(c) DOT Act 49 CFR 303	Consultation and clearance letter regarding recreational land disturbance and construction-related traffic impacts.	On August 2, 2012, ODOT commented on Jordan Cove's Traffic Impact Analysis. ODOT's review of Pacific Connector's Transportation Management Plans is pending.
	State Highway ROW ORS 374-305 OAR 734- 55	Permits to be issued from each DOT District Office to allow construction within State Highway ROW and use of State Highways for Project access.	Applications for ODOT road crossing permits would be submitted prior to and during construction on an as-needed basis.
Oregon Department of Water Resources (ODWR)	New Water Rights ORS 537 OAR 690-310	Issue permits to appropriate surface water and groundwater.	Pacific Connector submitted an application for a license to temporarily use surface waters for pipeline construction and testing. ODWR review pending.
	Temporary Water Use ORS 537 OAR 690-340	Issue limited licenses for temporary use of surface waters.	Pacific Connector anticipates submitting an application during the first quarter of 2015.
Oregon Public Utilities Commission (OPUC)	OAR 860-031	Authorize intrastate electric transmission lines. Inspect the natural gas facilities for safety.	Pending Pacific Connector's submittal of appropriate applications to OPUC. Pending operation of facilities.
LOCAL – COUNTIES			
Coos County	Coos County Zoning and Land Development Ordinance, Coos County Comprehensive Plan, and Coos Bay Estuary Management Plan (CBEMP) ORS 197.015(10)(b)(H)	Issue Conditional Use Permits. Zoning Changes and Verifications. Issue Land Use Compatibility Statement (LUCS) under Statewide Planning Goals.	On December 5, 2007, Coos County issued a Conditional Use Permit for the Jordan Cove LNG terminal. On January 3, 2008, Coos County approved conditional use of Jordan Cove's access channel and marine slip. On August 21, 2009, Coos County approved conditional use of Jordan Cove's upland terminal facilities, after remand from Oregon's Land Use Board of Appeals (LUBA). On September 23, 2009, Coos County approved Comprehensive Plan amendment and Zoning Map amendment for Jordan Cove's future use of the former Kentuck Golf Course for wetland mitigation. On December 16, 2009, Coos County approved a correction of maps of wetlands within CBEMP zoning district 6-WD for Jordan Cove's terminal. March 22, 2012, Coos County partly approved a correction of the Coastal Shoreline Boundary in the 7-D zone at the former Weyerhaeuser linerboard property.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
			On July 25, 2012, Coos County approved Jordan Cove's Notice of Planning Directors Decision – Administrative Boundary Interpretation for 6-WD and Administrative Conditional Use Request for Fill in 6-WD. On September 17, 2012, Coos County approved Jordan Cove's Notice of Planning Directors Withdrawal and Reissuance of Administrative Conditional Use and Boundary Interpretation ABI for CBEMP/To Allow Fill. On October 4, 2012, Coos County approved Jordan Cove's Notice of Planning Directors Decision – To Allow Fill in IND Zone, To Allow Fill in CBEMP 7-D Zone, Vegetative shoreline Stabilization in CBEMP 7-D. On December 13, 2012, Coos County approved Jordan Cove's Site Plan Review for Integrated Power Generation and Process Facility. On September 8, 2010, Coos County issued a Conditional Use Permit to Pacific Connector. On June 14, 2013, Coos County issued a LUCS to Pacific Connector.
	Section 311 of EPAct	Review and provide consultation regarding Jordan Cove's Emergency Response Plan.	On July 16, 2009, Jordan Cove signed concept agreements with the Coos County Sheriff's Office, Emergency Management, and Health Department.
Douglas County	Douglas County Comprehensive Plan and Douglas County Land Use and Development Ordinance ORS 197.015(10)(b)(H)	Issue Conditional Use Permits Issue LUCS	On December 11, 2009, Douglas County issued a Conditional Use Permit to Pacific Connector. On March 20, 2014, Douglas County Planning Commission approved a Major Amendment to its 2009 decision to allow the Pacific Connector pipeline to cross 7.3 miles within the Coastal Zone in Douglas County. That decision was affirmed by the Board of Commissioners for Douglas County on April 30, 2014. Douglas County then issued a revised LUCS on June 2, 2014 for the 7.3-mile portion of the pipeline within the Coastal Zone Management Area within Douglas County.

TABLE 1.5.1-1

Major Permits, Approvals, and Consultations for the JCE & PCGP Project

Agency	Authority/Regulation/ Permit	Agency Action	Initiation of Consultations and Permit Status
Jackson County	Jackson County Comprehensive Plan and Jackson County Land Development Ordinance ORS 197.015(10)(b)(H)	Issue Conditional Use Permits Issue LUCS	On June 18, 2013 Jackson County provided a LUCS for the Project. The LUCS indicated that the Project was not subject to the land development standards of the Jackson County Land Development Ordinance because it would be authorized by the FERC. Therefore, no conditional use permits would be necessary.
Klamath County	Klamath County Land Development Code ORS 197.015(10)(b)(H)	Issue Conditional Use Permits Issue LUCS	On August 21, 2012, Klamath County responded to the FERC NOI with a list of local permits that Pacific Connector should apply for. On June 10, 2013, Klamath County provided a LUCS for the Project. The LUCS indicated that if not authorized by FERC the Project would require county applications and review. Therefore, no conditional use permits would be necessary.
All Counties	Road Crossing Permits	Review permits to cross county roads.	To be submitted prior to construction.
	Grading Permits	Review permits for excavation and grading activities.	To be submitted prior to construction.
	Solid Waste Disposal	Review permits for disposal of solid waste generated by construction.	To be submitted prior to construction.
LOCAL – CITIES			
City of Coos Bay	CBEMP	Issue Conditional Use Permit Zoning Verification	On June 15, 2007, the City approved the establishment of a 2-acre eelgrass mitigation site in aquatic unit 52-NA.
City of North Bend	North Bend Comprehensive Plan	Conditional Use Permit Amend Chapters 18.04 and 18.44	On October 8, 2013, the City approved Jordan Cove's request to amend the M-H Heavy Industrial Zone to allow conditional use for temporary work force housing.
City of North Bend	North Bend City Code	Conditional Use Permit Amend Chapter 18.80	On February 14, 2014, the City approved variances to allow vehicle parking at drainage at Jordan Cove's proposed temporary work force housing site.
City of North Bend	North Bend City Code	Conditional Use Permit Amend Chapters 18.84 and 18.88	On March 25, 2014, the City approved an amendment to North Bend Shorelands Management Unit 48 to allow for bridge at Jordan Cove's temporary work force housing site.

1.5.1.1 Endangered Species Act

Section 7 of the ESA, as amended, states that "Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act," and any project authorized, funded, or conducted by a federal agency should not "jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined...to be critical" (16 U.S.C. Section 1536(a)(2)(1988)). The lead federal agency, or the applicant as a non-federal party, is required to consult with the FWS and the NMFS to determine whether any federally listed or proposed endangered or threatened species or their designated critical habitat occur in the vicinity of the Project. If, upon review of existing data, or data provided by the applicant, one (or both) of the Services find that any federally listed species or critical habitats may be affected by the Project, the FERC is required to prepare a biological assessment (BA) to identify the nature and extent of adverse impacts, and to recommend measures that would avoid, reduce, or mitigate impacts on habitats and/or species.

The FWS provided a Conservation Framework for the northern spotted owl (NSO; *Strix occidentalis caurina*) and marbled murrelet (MAMU; *Brachyramphus marmoratu*) to the applicants, to assist with their development of an applicant-prepared draft biological assessment (APDBA). The Conservation Framework identified impact analyses and categorization methods, as well as compensatory mitigation guidance for impacts on these species and their critical habitats. Jordan Cove and Pacific Connector filed their APDBA with the FERC on September 19, 2013, and revised it on April 7, 2014. The FERC reviewed the APDBA, and after updating information,[35] we will submit our own BA for the Project to the NMFS and FWS at about the same time that this DEIS is issued. Because our BA finds that the Project is likely to adversely affect some federally listed species, the FWS and NMFS should each develop a biological opinion (BO) as to whether authorizing the Project may jeopardize the continued existence of any species under their jurisdiction or adversely modify or destroy designated critical habitat. See section 4.7 of this EIS for a summary of our ESA analysis.

1.5.1.2 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with the NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH (MSA Section 305(b)(2)). Although absolute criteria have not been established for conducting EFH consultations, the NMFS recommends consolidated EFH consultations with interagency coordination procedures required by other statutes, such as the NEPA, the Fish and Wildlife Coordination Act, or the ESA to reduce duplication and improve efficiency (50 CFR 600). As part of the consultation process for this Project, we will consolidate an EFH Assessment with the BA, on behalf of the federal cooperating agencies for this Project. The FERC will submit its BA and EFH Assessment for the JCE & PCGP Project to the NMFS at about the same time that this DEIS is issued. See section 4.6 of this EIS for the status of the MSA review.

1.5.1.3 Marine Mammal Protection Act

All marine mammals are protected under the MMPA of 1972. This act was amended by the U.S. Congress in 1994. The MMPA prohibits, with certain exceptions, the taking of marine mammals

[35] After review of the APDBA, the FERC issued a data request to the applicants on December 13, 2013, to fill in information gaps. The applicants responded to that data request with filings on December 23, 2013, and February 7 and April 7, 2014.

in U.S. waters and by U.S. citizens on the high seas and the importation of marine mammals and marine mammal products into the United States. The term "take," as defined in Section 3 of the MMPA, means "to harm, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal" (16 U.S.C. Section 1362(13)). "Harassment" is also defined in the MMPA and in regulations promulgated by the NMFS.

Sections 101(a)(5)(A) and (D) of the MMPA direct the U.S. Secretary of Commerce, through the NMFS, to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specific geographic region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of authorization is provided to the public for review. Authorization would be granted by the NMFS if it finds that the taking will have a negligible impact on the species or stock, will not have an unmitigatable adverse impact on the availability of the species or stock for subsistence uses (where relevant), and it prescribes permissible methods of taking, and requirements pertaining to the mitigation, monitoring, and reporting of such taking. NMFS has defined "negligible impact" as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock though effects on annual rates of recruitment or survival."

The NMFS may use relevant portions of this EIS during its review, and may adopt measures to protect marine mammals outlined in this EIS. It may also require additional mitigation and monitoring measures to ensure that the taking result in the least practicable adverse impact on affected marine mammal species or stocks. The public would have an opportunity to comment to the NMFS in response to its Notice of Receipt of an application for an Incidental Harassment Authorization, or a request for the implementation of regulations governing incidental taking, and following the publication of the proposed rule.

On October 8, 2014, Jordan Cove and Pacific Connector submitted their draft application for Incidental Harassment Authorization (IHA) under the MMPA to the NMFS.[36] Impacts from the JCE & PCGP Project on marine mammals are discussed in sections 4.6 and 4.7 of this EIS. In addition, marine mammals listed under the ESA are discussed in detail in our BA and EFH Assessment.

1.5.1.4 Marine Protection, Research and Sanctuaries Act

In 1972, Congress enacted the MPRSA (also known as the Ocean Dumping Act) to prohibit the dumping of material into the ocean that would unreasonably degrade or endanger human health or the marine environment. Virtually all authorized materials dumped today are dredged materials (sediments) removed from the bottom of water bodies in order to maintain navigation channels and berthing areas.

Ocean dumping cannot occur unless a permit is issued under the MPRSA. In the case of dredged material, the decision to issue a permit is made by the COE, using the EPA's environmental criteria and subject to EPA's concurrence. EPA is also responsible for designating ocean dumping sites for dredged material, or sites for disposal of other materials.

[36] The IHA was filed with FERC on October 10, 2014, under Docket No. CP13-492.

Jordan Cove proposed to dump materials dredged during maintenance of its access channel and marine slip at Site F, an existing EPA-approved offshore placement site located in the Pacific Ocean about 1.8 miles from the mouth of Coos Bay (see section 2.1.1.12). Jordan Cove included a *Dredge Material Management Plan* with its JPA for review by the COE.

1.5.1.5 National Historic Preservation Act

Section 106 of the NHPA requires that federal agencies take into account the effects of their undertakings on historic properties, and afford the ACHP an opportunity to comment. Historic properties include prehistoric or historic sites, districts, buildings, structures, objects, landscapes, or properties of traditional religious or cultural importance listed on or eligible for listing on the National Register of Historic Places (NRHP). Jordan Cove and Pacific Connector, as non-federal parties, can provide cultural resources data, analyses, and recommendations to the FERC, as allowed by the ACHP's regulations for implementing Section 106, at 36 CFR 800.2(a)(3). However, the FERC remains responsible for all determinations.

As the lead federal agency, it is the FERC's responsibility, under Section 106 and its implementing regulations, to consult with the Oregon State Historic Preservation Office (SHPO), identify historic properties within the area of potential effect (APE), and make determinations of NRHP eligibility and project effects, on behalf of all the federal cooperating agencies. In order to comply with Section 101(d)(6)(B) of the NHPA, and the Native American Religious Freedom Act, the FERC is consulting with Indian tribes that may attach religious or cultural significance to historic properties in the APE,[37] also on behalf of the federal cooperating agencies. The BLM and Forest Service are proposing to amend their respective LMPs to make provision for the pipeline, and are responsible for consulting with affected tribes on those actions.

To resolve adverse effects at historic properties identified along the pipeline route that cannot be avoided, and outline additional phased cultural resources investigations, a Memorandum of Agreement (MOA)[38] was produced, and submitted to the ACHP on August 30, 2011. If the FERC authorizes the newly proposed Jordan Cove LNG export terminal and associated Pacific Connector pipeline, the MOA would be amended to account for the differences between the original projects under Docket Nos. CP07-441-000 and CP07-444-000 and the newly proposed activities under Docket Nos. CP13-483-000 and CP13-492-000. See section 4.11 of this EIS for a discussion of the status of compliance with the NHPA.

1.5.1.6 Rivers and Harbors Act

Section 10 of the RHA (33 U.S.C. Section 403) prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the

[37] See 36 CFR Part 800.2(c)(2)(ii). Indian tribes are defined in Part 800.16(m) as "…an Indian tribe, band, nation, or other organized group or community, including a native village, regional corporation, or village corporation, as those terms are defined in Section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602), which is recognized as eligible for special programs and services provided by the United States to Indians because of their status as Indians."

[38] July 2011 Memorandum of Agreement Between the Federal Energy Regulatory Commission, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, U.S. Forest Service, and the Oregon State Historic Preservation Office Regarding the Jordan Cove Liquefied Natural Gas Terminal and Pacific Connector Gas Pipeline Project (FERC Docket Nos. CP07-441-000 and CP07-444-000), with Jordan Cove, Pacific Connector, Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw, and the Coquille Indian Tribe as concurring parties.

construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been authorized by the COE. Jordan Cove and Pacific Connector submitted a JPA to the COE to obtain a permit under the RHA, as discussed in section 4.4 of this EIS.

1.5.1.7 Clean Water Act

The CWA (33 U.S.C. Section 1251 et seq.) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Section 404 of the CWA outlines procedures by which the COE can issue permits (after notice and opportunity for public hearings) for the discharge of dredged or fill material into waters of the United States at specified disposal sites. The EPA has the authority to review and veto COE decisions on Section 404 permits. The FWS and NMFS use their Fish and Wildlife Coordination Act authorities to review and comment during the 404 permitting process. Jordan Cove and Pacific Connector submitted a JPA to the COE to obtain a permit under Section 404 of the CWA.

The authority to issue Water Quality Certifications pursuant to Section 401 of the CWA and National Pollutant Discharge Elimination System (NPDES) permits pursuant to Section 402 of the CWA has been delegated to the ODEQ. Jordan Cove and Pacific Connector would submit their JPA to the ODEQ to obtain Water Quality Certifications under Section 401 of the CWA. The applicants intend to submit their applications to ODEQ for NPDES permits under Section 402 of the CWA to allow for the discharge of stormwater about one year prior to the start of Project construction. Section 4.4 of this EIS discusses impacts on water resources that may be applicable to compliance with the CWA.

1.5.1.8 Clean Air Act

The primary objective of the CAA, as amended, is to establish federal standards for various pollutants from both stationary and mobile sources, and to provide for the regulation of polluting emissions via state implementation plans. In addition, the CAA was established to prevent significant deterioration in certain areas where air pollutants exceed national standards and to provide for improved air quality in areas that do not meet federal standards (non-attainment areas).

The EPA has regulatory authority under the CAA. Section 309 of the CAA directs EPA to review and comment in writing on environmental impacts associated with all major federal actions. The EPA has delegated permitting authority under the CAA to the ODEQ. Emissions from all phases of construction and operation of the proposed LNG terminal and pipeline would be subject to applicable federal and state air regulations.

Jordan Cove submitted an air quality permit application to the ODEQ in March 2013. Pacific Connector would submit its air quality permit application later in 2014. Section 4.12.1 of this EIS has a detailed discussion of air quality issues.

1.5.1.9 Coastal Zone Management Act

In 1972, Congress passed the CZMA to “preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation’s coastal zone for this and succeeding generations” and to “encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone" (16 U.S.C. Section 1452, Section 303 (1) and (2)).

Section 307 (c)(3)(A) of the CZMA states that "any applicant for a required federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity will be conducted in a manner consistent with the program." In order to participate in the coastal zone management program, a state is required to prepare a program management plan for approval by the NOAA Office of Coast and Ocean Resource Management (OCRM). Once the OCRM has approved a plan and its enforceable program policies, a state program gains "federal consistency" jurisdiction. This means that any federal action (e.g., a project requiring federally issued licenses or permits) that takes place within a state's coastal zone must be found to be consistent with state coastal policies before the federal action can occur.

All components of the Jordan Cove LNG terminal, and the Pacific Connector pipeline from MP 0.0 to approximately MP 46 are within the designated Oregon coastal zone and are subject to federal CZMA review. The ODLCD is the state's designated coastal management agency and has established the Oregon Coastal Management Program (OCMP). The program's mission is to work in partnership with coastal local governments, state and federal agencies, and other stakeholders to ensure that Oregon's coastal and ocean resources are managed, conserved, and developed consistent with statewide planning goals. To accomplish this mission, the program combines various state statutes for managing coastal lands and waters into a single, coordinated package. These include: (1) the 19 Statewide Planning Goals, which are Oregon's standards for comprehensive land use planning; (2) city and county comprehensive land use plans; and (3) state agencies and natural resource laws such as the Oregon Beach Bill and the Removal-Fill Law.

Under the provisions of the CZMA, Jordan Cove and Pacific Connector must provide a certification to the FERC, COE, and the ODLCD that their projects comply with and would be conducted in a manner consistent with the state's approved management program (15 CFR 930.50 Subpart D). On August 1, 2014, Jordan Cove and Pacific Connector submitted their applications for Certification of Consistency to the ODLCD. The six-month period during which the ODLCD would review the applications would end on February 1, 2015. See section 4.1.1.2 of this EIS for further information regarding compliance with the CZMA.

1.5.1.10 Migratory Bird Treaty Act

Migratory birds are species that nest in the United States and Canada during the summer and migrate south to the tropical regions of Mexico, Central and South America, and the Caribbean for the nonbreeding season. Migratory birds are protected under the MBTA (16 U.S.C. Section 703–711). EO 13186 (66 Federal Register [FR] 3853) discusses federal agency responsibilities for conservation of migratory birds and their habitats. Destruction or disturbance of migratory bird nests, or any eggs or young contained within it, is a violation of the MBTA. The MBTA also prohibits other forms of taking of migratory birds. For certain limited circumstances, the FWS may authorize certain types of migratory bird take.

As directed by EO 13186, on March 30, 2011, the FERC and FWS entered into an MOU that focuses on migratory birds and strengthening conservation through enhanced collaboration between the agencies. This voluntary MOU does not waive legal requirements under the MBTA, Bald and Golden Eagle Protection Act, ESA, or any other statutes, and does not authorize the take of migratory birds. Section 4.6 discusses migratory bird species that inhabit the project area, and measures the applicants would implement to avoid, reduce, or mitigate impacts on migratory birds.

1.5.2 Review and Use of the FERC EIS by the BLM, Forest Service, and Reclamation

As cooperating agencies, BLM and Forest Service are responsible for the sections of this EIS that are relevant to their proposed actions (i.e., evaluation of plan amendments and issuance of a Right-of-Way Grant), and issuing independent RODs. Each agency independently decides whether to adopt the EIS as a basis for agency decisions pursuant to 40 CFR 1506.3.

The BLM Oregon/Washington State Director would be able to make the following decisions and determinations upon adoption the analysis in this EIS:

- Whether to amend the RMPs for the BLM Coos Bay, Roseburg, and Medford Districts and the Klamath Falls Resource Area of the Lakeview District as proposed or in an alternative; and
  Whether to issue a Right-of-Way Grant with conditions to the Project application or deny the application (Mineral Leasing Act of 1920, Section 185(f) and in accordance with 43 CFR 2882.3(i)). BLM cannot issue the Right-of-Way Grant without concurrence from the Forest Service and Reclamation.

The Forest Supervisor of the Umpqua National Forest would be able to make the following decisions and determinations based on the analysis in this EIS, if adopted:

- Whether to amend the LRMPs for the Umpqua, Rogue River, and Winema National Forests as proposed or in an alternative pursuant to 36 CFR 219.10(f) (1982 version);
- Determine the significance of the proposed amendments pursuant to 36 CFR 219.10(f) (1982 version), using criteria in Forest Service Manual - Land Management Planning (Section 1926.5);[39] and
  Determine whether the Forest Service would concur to the granting of a Right-of-Way Grant by the BLM, and, if so, issue a letter of concurrence upon amendment of the respective National Forest LRMPs to make provision for the Project.

For the Forest Service, changes to their LMPs that are not significant can result from:

1. Actions that do not significantly alter the multiple-use goals and objectives for long-term land and resource management;
2. Adjustments of management area boundaries or management prescriptions resulting from further on-site analysis when the adjustments do not cause significant changes in the multiple-use goals and objectives for long-term land and resource management;
3. Minor changes in standards and guidelines; and
4. Opportunities for additional projects or activities that will contribute to achievement of the management prescription.

[39] The BLM does not have a similar requirement.

The criteria by which the Forest Service determines if an amendment is significant are as follows:

- The change would significantly alter the long-term relationship between levels of multiple-use goods and services originally projected; and
- The change may have an important effect on the entire LMP or affect land and resources throughout a large portion of the planning area during the planning period.

In accordance with 36 CFR 219.17(b)(2), the Forest Service has elected to use the 1982 planning rule procedures to amend LRMPs, as provided in the transition procedures of the 2000 planning rule.

Reclamation's Mid-Pacific Region Klamath Basin Area Office Manager would be able to make the following decision and determination based upon the analysis in this EIS:

- Determine whether Reclamation would concur by issuance of a letter of concurrence to the granting of a Right-of-Way Grant by the BLM.

Before BLM can issue the Right-of-Way Grant that allows the Project to occupy federal lands, the applicant is required to submit a complete POD to address all relevant construction and post-construction activities, including off-site mitigation plans. If upon adoption of the EIS and issuance of a ROD, the BLM issues a Right-of-Way Grant with concurrence of the Forest Service and Reclamation, that grant will stipulate specific conditions, including those described in the approved POD, related to lands, facilities, and easements within its respective jurisdiction.

1.5.2.1 Consistency with Federal Land Management Plans

Approximately 71 miles of the Pacific Connector pipeline route would cross federal lands administered by the BLM or the Forest Service. The pipeline route would cross portions of four BLM Districts and three National Forests. Land within each BLM District is managed in accordance with the District's RMP, while land within each National Forest is managed according to the National Forest's LRMP. Under these plans, BLM and NFS lands are divided into land allocations, each of which has specific goals and objectives as well as corresponding standards and guidelines (Forest Service LRMPs) or management direction (BLM RMPs). Before BLM can issue a Right-of-Way Grant for the Project, the BLM and the Forest Service must determine that the Project is consistent with all applicable BLM and Forest Service LMPs.

In 1994, the ROD for the Northwest Forest Plan (NWFP) amended LMPs for federal lands within the range of the NSO including the LRMPs of the Umpqua, Rogue River, and Winema National Forests. Subsequently in 1995, the RMPs of the BLM's Coos Bay, Roseburg, Medford Districts, and Klamath Falls Resource Area of the Lakeview District, were revised to incorporate the requirements of the NWFP. Thus the elements of the NWFP have been incorporated into the LMPs of all seven administrative units of the BLM and Forest Service that may be included in the BLM Right-of-Way Grant. The NWFP represented a major shift in focus for federal land management agencies in the affected area from an emphasis on intensive timber management to an emphasis on the maintenance of biodiversity and habitat for species dependent on late-successional and old-growth (LSOG) forests. The NWFP provided a comprehensive conservation strategy for managing late-successional and old-growth forests and promoting the long-term health of the rich diversity of plant and animal communities and species that are an integral part of that ecosystem.

The core components of the NWFP conservation strategy are: (1) a network of mapped and unmapped LSRs distributed across the landscape where management actions must protect or enhance late-successional forest conditions; (2) an aquatic conservation strategy providing for the delineation of Riparian Reserves and other measures to maintain and restore aquatic and riparian habitats; and (3) a series of broadly stated standards and guidelines to guide development of on-the-ground projects for implementation of the conservation strategy. The NWFP also addresses the need to protect rare and poorly known plant and animal LSOG species broadly referred to as Survey and Manage (S&M) species. The standards and guidelines for S&M species were amended in 2001.

When projects comply with the standards and guidelines or management direction of a LMP, they are "consistent" with that plan. Conversely, projects that are not consistent with these standards and guidelines are generally not consistent with the plan. When a project is not consistent with the governing LMP(s) where the action occurs, the following three options are available to the land management agency:

- The agency does not approve the project and it is not implemented;
- The applicant modifies the project to make it compliant with the underlying LMP(s); or
- The agency amends the underlying LMP to make provision for the project to go forward.

This EIS documents actions that would be taken by Pacific Connector to avoid, reduce, or mitigate impacts by incorporating a wide range of conservation measures and BMPs, including adopting the May 2013 versions of the FERC's *Erosion Control and Revegetation Plan* (FERC's *Plan*) and our *Wetland and Waterbody Construction and Mitigation Procedures* (FERC's *Procedures*), and various attachments to the POD. Taken in whole, these actions are intended to ensure that the Project may ultimately conform to the governing BLM and Forest Service LMPs. Collectively, these actions, including all elements of the POD, would become enforceable conditions of the Right-of-Way Grant, if issued.

The linear nature of the pipeline corridor makes it impossible to avoid every circumstance that would be inconsistent with the stringent management requirements and standards and guidelines of RMPs and LRMPs for federal lands within the range of the NSO. As proposed, the Pacific Connector Pipeline Project is not consistent with some aspect of each of the relevant LMPs at some locations, and amendments to these plans are required in order to make provision for the Project to proceed. The BLM process for amending an RMP is set forth in 43 CFR 1610.5, while the complementary Forest Service process for amending an LRMP is set forth in 36 CFR 219, Subpart B. These amendments have environmental consequences that are evaluated in this EIS. Some of the environmental issues directly related to amendment of elements of these LMPs include:

- Effects on S&M species and their habitat and the degree to which the pipeline project may threaten the continued persistence of affected species within the range of the NSO (approximately 448 sites of 78 species could be affected by the pipeline project, including approximately 369 sites of 67 species within the clearing limits of the pipeline corridor, 94 of which are occupied by *Arborimus longicaudus* [red tree vole]);
- Effects on LSR functionality and the degree to which mitigating effects of "Matrix to LSR" land reallocations and other mitigations render the Pacific Connector Pipeline Project neutral or beneficial to the creation and maintenance of late-successional habitat

(approximately 408 acres of LSR would be cleared with project construction and 1,896 acres of Matrix would be reallocated as LSR);

- Effects on contiguous existing or recruitment habitat of MAMUs within 0.5 mile of occupied sites (approximately 39 acres of habitat would be cleared with construction of the pipeline project), the impact of these habitat losses on LSR network functionality; and

  Effects on habitat at three Known Owl Activity Centers (KOACs), and the impact of the approximately 7 acres of habitat removal on LSR network functionality.

The loss of BLM General Forest Lands through "Matrix to LSR" reallocation would be offset by the applicant acquiring timber-producing lands so the BLM can maintain their timber-producing base.

Other issues associated with Forest Service plan amendments that must be evaluated in the context of their significance to the delivery of goods and services or attainment of LRMP goals and objectives include:

- Effects of removal of effective shade on perennial streams on the Umpqua National Forest;
- Effects of crossing approximately 2 acres of the Management Area (MA) 26, Restricted Riparian land allocation on the Rogue River National Forest and of running parallel to riparian areas on the Umpqua National Forest for approximately 0.1 mile;
- Effects on changes in visual quality objectives on the Rogue River and Winema National Forests; and

  Effects of detrimental soil conditions caused by soil displacement and compaction on the Winema, Rogue River, and Umpqua National Forests.

With the exception of the boundary changes resulting from the reallocation of Matrix land to LSR, these proposed BLM and Forest Service amendments to BLM and Forest Service LMPs are Project-specific, and apply only to the Pacific Connector Pipeline Project, if authorized.

Appendix E of this EIS contains an assessment regarding the Project's consistency with federal LMPs. Table 1.5.2.1-1 categorizes the proposed amendments by these major issues and BLM/Forest Service administrative unit. The designations of the various proposed amendments refer to the NOI published by the Forest Service and BLM in the *Federal Register* on September 21, 2012.

As is evident in table 1.5.2.1-1, amendments associated with S&M species are relevant to all land allocations on each of the seven BLM and Forest Service administrative units, while those associated with LSR impacts (and related mitigation) are relevant to only the BLM Coos Bay and Roseburg Districts and the Umpqua and Rogue River National Forests. For the BLM Medford District and the Klamath Falls Resource Area, only S&M species amendments are relevant. S&M species and LSR-related amendments are the only amendments relevant to any of the BLM districts. On the National Forests, many other issues, including soil displacement/compaction and visual quality objectives (VQOs), require plan amendments for the Project to be a conforming use under the governing LRMPs.

TABLE 1.5.2.1-1

BLM and Forest Service Land Management Plan Consistency and Proposed Amendments

Standards and Guidelines or Management Direction a/	Proposed Plan Revision (Amendment)	BLM District				National Forest		
		Coos Bay	**Roseburg**	**Medford**	**Lakeview (KFRA)**	**Umpqua**	**Rogue River**	**Winema**
Requirement to protect Survey and Manage species habitat	Site-specific waiver of management recommendations for protection of known sites of Survey and Manage species	BLM/FS-1	BLM/FS-1	BLM/FS-1	BLM/FS-1	BLM/FS-1	BLM/FS-1	BLM/FS-1
Requirement to protect habitat in contiguous existing or recruitment habitat for marbled murrelet (MAMU) within 0.5 mile of occupied sites	Site-specific exemption of requirement to protect MAMU habitat	BLM-1	BLM-1					
Requirement to protect habitat in Known Owl Activity Centers (KOACs)	Site-specific exemption of requirement to retain habitat in KOACs		BLM-2					
Requirement to mitigate for impacts to Late-Successional Reserves (LSRs)	Reallocation of Matrix Lands to LSR	BLM-4	BLM-3			UNF-4	RRNF-7	
Forest-wide Standards and Guidelines for fisheries prohibit removal of effective shade on perennial streams	Site-specific amendment to allow removal of effective shade on perennial streams					UNF-1		
Standards and Guidelines for riparian land allocation require that transmission corridors be located outside these areas	Site-specific amendment to allow utility corridors in riparian areas					UNF-2	RRNF-5	
Standards and Guidelines for Management Area (MA) 3 do not allow new utility corridors in the management area	Site-Specific Amendment to allow utility corridors in MA 3							WNF-1
Standards and Guidelines for soils allow only a certain amount (10-20 percent) of displacement and compaction, depending on the land allocation	Site-specific amendment to waive limitations on detrimental soil conditions					UNF-3	RRNF-6	WNF-4 WNF-5
Visual quality objectives (VQO) must be met within a specified timeframe	Site-specific amendment of VQOs						RRNF-2 RRNF-3 RRNF-4	WNF-2 WNF-3

a/ BLM RMPs use the term "Management Direction" for on-the-ground requirements that projects must meet on BLM lands. Forest Service LRMPs use the term "Standards and Guidelines" for on-the-ground requirements that projects must meet on NFS lands.

1.5.2.2 BLM Review and Approval Requirements

Adopt FERC EIS

As a cooperating agency, the BLM would consider adopting the EIS for the Project pursuant to 40 CFR 1506.3(c) if, after an independent review of the document, the BLM Oregon/Washington State Director concurs that the analysis provides sufficient evidence to support agency decisions and is satisfied that agency comments and suggestions have been addressed.

Issue ROD that Amends RMPs

If the EIS for the Project is adopted by the BLM, the agency may issue a ROD that would document the Oregon/Washington State Director's decision regarding approval of amendments to the RMPs to make provision for the Project to move forward.

Issue ROD for Award of a Right-of-Way Grant to Authorize Occupancy of Federal Lands

Concurrent with amendment of RMPs, the Oregon/Washington State Director may issue a ROD to award a Right-of-Way Grant for the Project. The BLM would consult with the Forest Service and Reclamation before making a decision regarding issuance of the Right-of-Way Grant.

Issue Right-of-Way Grant

Prior to occupancy of federal lands by the Project, a Right-of-Way Grant must be issued by the BLM. If issued by the BLM, the Right-of-Way Grant would include: (1) a POD, which would contain, among other requirements: conditions and mitigation measures identified in the EIS; (2) standards and site-specific stipulations (including mitigation measures) developed by BLM and Forest Service; and (3) terms and conditions from the BOs issued by the FWS and NMFS.

1.5.2.3 Forest Service Review and Approval Requirements

Adopt FERC EIS

As a cooperating agency, the Forest Service would consider adopting the EIS for the Project pursuant to 40 CFR 1506.3(c) if, after an independent review of the document, the Forest Supervisor of the Umpqua National Forest concurs that the analysis provides sufficient evidence to support agency decisions and is satisfied that agency comments and suggestions have been addressed.

Issue ROD that Amends LRMPs

If the EIS for the Project is adopted by the Forest Service, the agency may issue a ROD that would document the decision of the Forest Supervisor of the Umpqua National Forest regarding approval of amendments to LRMPs to make provision for the Project. The ROD would include statements of plan consistency and determinations of significance of effects of plan amendments on the delivery of goods and services under the plan.

Issue Letter of Concurrence to BLM

The Forest Service would use the NEPA process to issue a letter of concurrence to BLM regarding the issuance of a Right-of-Way Grant for the portion of the route crossing NFS lands administered by the Forest Service.

1.5.2.4 Reclamation Review and Approval Requirements

Issue Letter of Concurrence to BLM

Reclamation would use the NEPA process to issue a letter of concurrence to the BLM regarding the issuance of a Right-of-Way Grant for the portion of the pipeline route crossing lands and facilities of the Klamath Project administered by Reclamation's Mid-Pacific Region Klamath Basin Area Office.

1.5.3 Reviews by Other Federal Agencies

1.5.3.1 Coast Guard Review

The Coast Guard exercises regulatory authority over LNG facilities that affect the safety and security of port areas and navigable waterways under EO 10173; the Magnuson Act (50 U.S.C. Section 191); the Ports and Waterways Safety Act of 1972, as amended (33 U.S.C. Section 1221 et seq.); and the Maritime Transportation Security Act of 2002 (46 U.S.C. Section 701). The Coast Guard is responsible for matters related to navigation safety, vessel engineering and safety standards, and all matters pertaining to the safety of the facilities or equipment located in or adjacent to navigable waters up to the last valve immediately before the LNG storage tanks. The Coast Guard also has authority for LNG facility security plan review, approval, and compliance verification as provided in 33 CFR 105, and siting as it pertains to the management of vessel traffic in and around the LNG facility. As required by its regulations, the Coast Guard is responsible for issuing an LOR as to the suitability of the waterway for LNG marine traffic.

In accordance with 33 CFR 127.007, each applicant must submit a Letter of Intent (LOI) to the local COTP to begin the LOR process. Jordan Cove submitted an LOI to the Coast Guard for its original LNG import Project in 2006. The Coast Guard has informed Jordan Cove that the previous LOI is suitable for the current Project provided it is amended to address any operating changes required for the change from an import to export terminal.

On June 14, 2005, the Coast Guard issued a *Navigation and Vessel Inspection Circular – Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic* (Navigation and Carrier Inspection Circular [NVIC] 05-05). The purpose of the NVIC 05-05 is to provide Coast Guard COTPs/Federal Maritime Security Coordinators, members of the LNG industry, and port stakeholders with guidance on assessing the suitability of a waterway for LNG marine traffic that takes into account conventional navigation safety/waterway management issues contemplated by the existing LOI/LOR process, but in addition, will also take completely into account maritime security implications. In accordance with this guidance, each LNG project applicant is to submit a WSA to the cognizant COTP. On December 22, 2008, the Coast Guard published a second NVIC, *Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities* (NVIC 05-08; Coast Guard 2008). The purpose of NVIC 05-08 is to revise the format of the LOR to conform to its intended effect of being a recommendation of the waterway suitability to the FERC. The NVIC 05-08 is further discussed in section 4.13. On January 24, 2011, the Coast Guard published a third NVIC: *Guidance Related To Waterfront Liquefied Natural Gas (LNG) Facilities* (NVIC 01-2011). The purpose of NVIC 01-2011 is to revise the format of the LOR to conform to its intended effect of being a recommendation to FERC as to the suitability of the waterway. In this NVIC, the Coast Guard has added guidance on release of the LOR and message management, and provides an updated template for the LOR analysis. The WSR was issued pursuant to NVIC 05-05. The final review and LOR were issued pursuant to NVIC 05-08, which replaced NVIC 05-05. NVIC 05-08 eliminated the term WSR and replaced it with "Letter of Recommendation (LOR) Analysis." For the purpose of clarity, the WSR is equivalent to the LOR Analysis. Section 813 of the Coast Guard Authorization Act of 2010 requires the Coast Guard to consider recommendations made by the States prior to making a recommendation to FERC on the suitability of the waterway for marine traffic associated with an LNG facility. Although this law was effective after the WSR and LOR were issued, the ODE (as lead State agency) was an active participant in the WSA validation committee and concurred with the verbiage of the WSR and LOR.

Jordan Cove submitted a WSA to the Coast Guard for its original LNG import project in 2006. The Coast Guard issued a WSR on July 1, 2008, and issued an LOR on April 24, 2009, which are both still valid. The Coast Guard acknowledged the validity of the WSR and LOR in their letter to Amergent Techs (Jordan Cove's contractor) on February 21, 2012. Jordan Cove submitted to the Coast Guard on January 13, 2014 its most recent annual review of the WSA. On February 14, 2014, the COTP indicated that the risks associated with the waterway and the terminal facility as originally evaluated did not substantially change for the newly proposed LNG export Project. The public portions of the Coast Guard's WSR and LOR are attached to this EIS as appendix B. See section 4.13 of this EIS for additional discussion of marine safety.

1.5.3.2 U.S. Department of Defense Consultation

As required by Section 311(f) of the EPAct and Section 3 of the NGA, we have consulted with the U.S. Department of Defense (DOD) to determine if there would be any impacts associated with the Project on military training or activities on any active military installations. On September 27, 2012, we sent a letter to the DOD Siting Clearinghouse informing them of the Project, and requesting comments. Colonel Suzanne Johnson, Military Assistant to the Executive Director of the DOD Siting Clearinghouse responded, in a letter to the FERC dated November 2, 2012, that the Project would have minimal impact on military operations in the area. Therefore, the DOD does not oppose construction of the Project.

1.5.3.3 U.S. Army Corps of Engineers Review

The COE is the primary federal agency responsible for reviewing and processing applications for permits pursuant to Section 404 of the CWA and Section 10 of the RHA. Jordan Cove and Pacific Connector submitted their single comprehensive JPA to the COE in October 2013. The COE would process the JPA in accordance with its regulations at 33 CFR Parts 320 through 330 and supporting guidance.

In an October 9, 2012, letter to the FERC responding to our NOI, the COE requested that this EIS address the following topics:

- purpose and need for the Project;
- characterization of waterbodies and wetlands (including high tide line, mean high water, ordinary high water, and wetland boundaries);
- classifications of fisheries in waterbodies;
- waterbody and wetland construction drawings;
- potential to encounter contaminated sediments;
- modifications to the FERC's Plan and Procedures; and
  proposed compensatory mitigation measures.

The COE can adopt the FERC's EIS for its NEPA purposes, and to document compliance with other federal laws, including the ESA, MSA, and NHPA. The purpose and need for the Project are briefly summarized in section 1.3 above. We discuss issues pertaining to impacts on water resources and wetlands, including contaminated sediments and proposed mitigation measures, in section 4.4 of this EIS. Fisheries are discussed in section 4.6. Modifications to the FERC's *Plan* and *Procedures* are addressed in sections 4.4 and 4.6.

1.5.3.4 U.S. Environmental Protection Agency Review

The EPA shares responsibility for administering and enforcing Section 404 of the CWA with the COE. The COE administers the day-to-day program, including individual permit decisions and jurisdictional determinations; develops policy and guidance; and enforces Section 404 provisions. The EPA develops and interprets environmental criteria used in evaluating permit applications, identifies activities that are exempt from permitting, reviews/comments on individual permit applications, enforces Section 404 provisions, and has authority to veto COE permit decisions.

The EPA also co-administers the MPRSA with the COE. Section 103 of the MPRSA authorizes the COE to issue permits for the ocean disposal of dredged material. That permit decision is made using the EPA's environmental criteria and is subject to EPA's concurrence if disposal is proposed at an EPA-designated site, under Section 102 of the MPRSA. Use of an EPA site must also meet the requirements of the site's Site Management and Monitoring Plan.

In addition, the EPA has an obligation under Section 309 of the CAA to review and comment in writing on the environmental impact associated with all major federal actions. This obligation is independent of its role as a cooperating agency under the NEPA regulations. Consistent with this direction, EPA evaluates all federally issued EISs for adequacy in meeting the procedural and public disclosure requirements of the NEPA.

1.5.3.5 U.S. Fish and Wildlife Service and National Marine Fisheries Service Review

The FWS and NMFS have the authority under the ESA to work with federal agencies and applicants to conserve ESA-listed species and their critical and other habitats. The FWS and NMFS will consult with lead federal agencies for actions that may affect ESA-listed species and/or critical habitats. The FWS and NMFS have the authority under the Fish and Wildlife Coordination Act (FWCA) to review applications for CWA Section 404 and Section 401 permits. The FWS has authority under the MBTA and EO 13186 and its associated MOUs with federal agencies to conserve migratory birds and their habitats. NMFS has the authority under the MSA and MMPA to review a project's impacts to essential fish habitats and to protect marine mammals. Concurrent with the issuance of this EIS, the FERC would submit its BA and EFH Assessment for this Project to the FWS and NMFS. In response, the Services would enter into formal consultations and produce their individual BOs for the Project. In addition, the NMFS would review the draft application for IHA under the MMPA submitted by Jordan Cove and Pacific Connector in October 2014, and would issue a Letter of Authorization under Section 101(a)(5) of the MMPA and 50 CRF 216 subpart 1.

1.5.3.6 U.S. Department of Energy Review

DOE's authority to regulate the export of the natural gas commodity arises from Section 3 of the NGA. By law, under Section 3(c) of the NGA, applications to export natural gas to countries with which the United States has FTAs that require national treatment for trade in natural gas are deemed to be consistent with the public interest and the Secretary must grant authorization without modification or delay.

In the case of LNG export applications to non-FTA nations, NGA Section 3(a) requires DOE to conduct a public interest review and to grant the applications unless DOE finds that the proposed exports will not be consistent with the public interest. Additionally, the NEPA requires DOE to consider the environmental impacts of its decisions on non-FTA nations export applications. In this regard, DOE acts as a cooperating agency with the FERC as the lead agency in this EIS pursuant to the requirements of the NEPA. The DOE authorized Jordan Cove to export LNG to FTA Nations and non-FTA Nations in Orders issued in December 2011 and March 2014, respectively.

1.5.3.7 U.S. Department of Transportation Review

The DOT is a cooperating agency in the production of this EIS. The DOT would review the design and construction of the Project under 49 CFR 193. In June 2014, PHMSA accepted Jordan Cove's methodologies for modeling credible leak scenarios at the terminal. This is discussed in more detail in section 4.13 of this EIS.

1.5.4 State Agency Permits and Approvals

In addition to the federal permitting authorities that have been delegated to the states, as discussed above, various laws and regulations promulgated by the state of Oregon pertain to the JCE & PCGP Project. The Coast Guard also worked with representatives of the state of Oregon in reviewing the WSA for the Project.

The FERC encourages cooperation between applicants and state and local authorities, but this does not mean that state and local agencies, through application of state and local laws, may prohibit or unreasonably delay the construction or operation of facilities approved by the FERC. Any state or local permits issued with respect to FERC regulated facilities must be consistent with the conditions of any Certificate the FERC may issue.[40]

Oregon permits, authorizations, and consultations with state agencies relevant to the Project are listed in table 1.5.1-1. Reviews by Oregon state agencies are discussed below.

1.5.4.1 Oregon Department of Agriculture

The Oregon Department of Agriculture (ODA) maintains the state list of endangered and threatened species, in accordance with Oregon Administrative Rule (OAR) Chapter 603, Division 73, and reviews reports of botanical surveys under Oregon Senate Bill 533 and its corresponding Oregon Revised Statute (ORS) 564. These state laws and regulations require surveys for state listed species on non-federal public lands prior to ground-disturbing activities, unless habitat for the species does not exist in the project area. Furthermore, the ODA Noxious Weed Control Program and the Oregon State Weed Board maintain the State Noxious Weed List for the State of Oregon.

[40] See, e.g., *Schneidewind v. ANR Pipeline Co*., 485 U.S. 293 (1988); *National Fuel Gas Supply v. Public Service Commission*, 894 F.2d 571 (2n Cir. 1990); and Iroquois Gas Transmission System, L.P., *et al.*, 52 FERC 61,091 (1990) and 59 FERC 61,094 (1992).

Botanical surveys for special status species, including state listed species under the jurisdiction of the ODA, were conducted by the applicants' contractors where access was granted. On September 15, 2008, the ODA indicated that no state listed plant species would be adversely affected at the LNG terminal, based on Jordan Cove's original botanical survey results.[41] Because areas where access was previously denied along the proposed pipeline route cannot be surveyed by Pacific Connector until after a Certificate is issued by the FERC, providing the company with the power of eminent domain, complete botanical survey reports would be submitted to ODA prior to construction that document all suitable habitat and state listed plant species that may be affect by the Project. Potential Project-related impacts on upland plant species are discussed in section 4.5 of this EIS, while wetland plant species are discussed in section 4.4.

1.5.4.2 Oregon Department of Energy

According to the EPAct, the Governor of a state in which an LNG terminal is proposed is to designate an appropriate state agency to consult with the Commission. That state agency should provide the FERC with an advisory report on state and local safety concerns, within 30 days of the FERC's notice of an application for an LNG terminal, for the Commission to consider prior to making a decision. The ODE has been designated by the Governor of Oregon as the state agency to coordinate the review of proposed LNG projects by other state agencies and consult with the FERC. However, the ODE did not submit a State Safety Advisory Report to the FERC in response to our Notice of Application issued on May 30, 2013, for Jordan Cove's LNG export terminal under Docket No. CP13-483-000.[42]

In addition, the ODE's EFSC would have authority to approve or disapprove Jordan Cove's South Dunes Power Plant, and if approved, the EFSC would issue a site certificate. The types of facilities under EFSC's jurisdiction are defined in ORS 469.300. The rules and procedures for review of an Oregon-jurisdictional energy facility by EFSC are outlined in OAR Chapter 345, Divisions 1,11,15,20, 21-24, 26-28, and 30-95. During the review process, the company would file a Notice of Intent, EFSC would issue a Project Order, the company would file its Application for a Site Certificate, and EFSC would issue its Final Order, which is the decision document, after hearings in consideration of a Draft Order.

Jordan Cove filed its original Notice of Intent for the South Dunes Power Plant with the EFSC on August 1, 2012, and amended that notice on November 30, 2012. EFSC issued a public notice, and took comments on the amendment up through January 4, 2013. On February 14, 2013, EFSC issued its Project Order for the South Dunes Power Plant. Jordan Cove has not yet filed its Application for a Site Certificate with the EFSC. We discuss the South Dunes Power Plant under non-jurisdictional facilities in section 2.2.1 of this EIS.

The ODE also is the state agency that would enforce Oregon's carbon dioxide (CO_2) emission standards, and would enforce the state's requirements for retirement bonds. Our analysis of CO^2 emissions can be found in section 4.12.1 of this EIS. The ODE signed an MOU with Jordan

[41] Jordan Cove updated the botanical survey report as Appendix B.3 of Resource Report 3 filed with its May 2013 application to the FERC. Jordan Cove has not yet documented ODA review of the 2013 report.

[42] Oregon state agencies filed environmental comments with the FERC about the proposed Jordan Cove LNG export terminal on October 29, 2012, in response to our NOI issued on August 2, 2012. On June 20, 2013, the ODE filed with the FERC a motion to intervene and statement of position, but we do not consider that statement to represent the State Safety Advisory Report.

Cove on June 10, 2014 regarding compliance with the state's CO_2 standards and its Retirement and Financial Assurance Standard for the LNG terminal.[43] We discuss future potential abandonment of facilities in section 2.9 of this EIS.

1.5.4.3 Oregon Department of Environmental Quality

The ODEQ is responsible for protecting and enhancing Oregon's water and air quality, managing the proper disposal of hazardous and solid waste, overseeing clean-ups of spills or releases of hazardous materials, and enforcing Oregon's environmental laws and regulations. The agency's duties to regulate sewage treatment and disposal systems are found in ORS Chapter 454, for solid waste management in Chapter 459, hazardous materials in Chapters 465 and 466, air and water quality in Chapter 468, and ballast water in Chapter 783. EPA has delegated authority to ODEQ under both the CWA and CAA. The state rules for administration of those authorities can be found in OAR 340, Division 40 for groundwater quality protection; Divisions 41, 42, and 48 for water quality; Division 45 for NPDES permits; Division 44 for waste disposal wells; Divisions 49-50, 53, and 55 for wastewater; Divisions 93-98 for solid waste; Divisions 100-104 for hazardous waste; Division 143 for ballast water; and Divisions 2002, 202, 204, 208, 210-216, 218, 220, 222-226, 228, 232, 236, 238, 240, 244, 246, and 250 for air quality.

Under its delegated responsibilities, the ODEQ issues CWA Section 401 Removal and Fill Water Quality Certificate permits, Water Pollution Control Facility permits, and NPDES permits under Section 402 of the CWA. Pacific Connector stated that it provided the ODEQ with water quality information when it submitted its JPA to the COE. The company also applied for coverage under ODEQ's general NPDES permit for discharge of construction stormwater. Water quality issues are addressed in detail in section 4.4 of this EIS.

Under its delegated responsibilities required by the CAA, ODEQ administers the Title V Air Permit program and the acid rain program, and issues air contaminant discharge permits (ACDP). The agency is also responsible for enforcing greenhouse gas (GHG) reporting requirements, and collecting data on GHG emissions for certain facilities that hold Title V or ACDP operating permits. In addition, ODEQ makes determinations about the Prevention of Significant Deterioration (PSD) of air quality from new major sources or major modifications at existing sources, and reviews air quality analyses completed to comply with National Ambient Air Quality Standards (NAAQS).

Jordan Cove submitted its air quality permit application to the ODEQ in March 2013, and its multisource air quality modeling protocol to the ODEQ in April 2013. Pacific Connector is still consulting with the ODEQ regarding the requirements of an air quality permit and modeling protocol, but has not yet provided ODEQ with anything official. Air quality issues are addressed in section 4.12.1 of this EIS.

1.5.4.4 Oregon Department of Fish and Wildlife

The ODFW is responsible for keeping the state sensitive fish and wildlife list and developing the state's Wildlife Diversity Plan. The purpose of the Fish and Wildlife Habitat Mitigation Policy (OAR 345-22-60) developed by the ODFW is to apply consistent goals and standards to mitigate impacts on fish and wildlife habitat caused by land and water development actions. The policy

[43] The MOUs between the State of Oregon and Jordan Cove were filed with the FERC on July 1, 2014 in Docket No. CP13-483-000.

provides goals and standards for general application to individual development actions, and for the development of more detailed policies for specific classes of development actions or habitat types. In implementing this policy, the ODFW will recommend or require mitigation for losses of fish and wildlife habitat resulting from development actions. Priority is given to native species. Both Jordan Cove and Pacific Connector have voluntarily agreed to categorize habitat on lands affected by the Project and seek mitigation of impacts on wildlife in a manner consistent with the ODFW's policies. Both applicants consulted with the ODFW regarding habitat categorization during 2008 and 2009. Jordan Cove filed with the FERC its latest revision of its *Wildlife Habitat Mitigation Plan* on July 1, 2014, that is supposed to address ODFW comments on an earlier version. Pacific Connector has not yet submitted its *Wildlife Habitat Mitigation Plan* to ODFW for review.

ODFW would also review fish screening at water intakes under ORS 498-306. Under ORS 509 and OAR 635, ODFW has responsibilities for review of stream crossing plans to provide for passage of native migratory fish. Pacific Connector has applied to the ODFW for approval of fish passage measures at waterbodies crossed by the pipeline route. On January 29, 2014, Jordan Cove submitted its *Draft Wildlife Salvage Plan* to ODFW (filed with its application to the FERC as Attachment 12 of its POD). Pacific Connector also applied to the ODFW for a permit to conduct in-water blasting at waterbodies with exposed bedrock. Further discussions of fish and wildlife issues can be found in section 4.6 of this EIS.

1.5.4.5 Oregon Department of Forestry

The ODF manages State Forests for the Greatest Permanent Value. The ODF has created a Forest Management Plan to provide strategic direction and guide management activities. Part of the plan is to identify multi-purpose objectives, and protect sensitive resources according to the state's Land Management Classification System. The ODF also monitors the commercial harvest of forest products from private timber lands, according to the Oregon Forest Practices Act. The ODF is responsible for protection of non-federal and private forest lands from wildfires. Pacific Connector would prepare and submit to the ODF State Forester for approval a written plan, describing how the pipeline would be in compliance with the Forest Practices Act (OAR 629-605-170), prior to harvesting activates. Pacific Connector's June 2013 application to the FERC contained a *Right-of-Way Clearing Plan*, a *Fire Prevention and Suppression Plan*, and a *Prescribed Burning Plan* as part of its POD. This EIS discusses potential Project-related impacts on timber in section 4.5.2.

1.5.4.6 Oregon Department of Geology and Mineral Industries

The mission of the Oregon Department of Geology and Mineral Industries (DOGAMI) is to provide earth science information for the citizens of Oregon. DOGAMI identifies and quantifies natural hazards, and works to minimize potential impacts of earthquakes, landslides, and tsunamis. Its administrative rule at OAR 632, includes the identification of Tsunami Inundation Zones under Division 5. The agency is also the steward of Oregon's mineral resources, and it regulates mining activities, and oil and gas exploration and production on non-federal lands. Jordan Cove and Pacific Connector obtained baseline information about geological hazards from DOGAMI.

Jordan Cove has prepared a Tsunami Hydrodynamic Modeling Methodology. DOGAMI has reviewed this modeling effort, and recommended using their rupture Scenario L1 to best represent the 2,475-year hazard level design criteria outlined in the revised FERC seismic design criteria. This EIS addresses geological hazards in section 4.2.

1.5.4.7 Oregon State Historic Preservation Office

The FERC, as the lead federal agency, on behalf of the federal cooperating agencies, would consult with the Oregon SHPO regarding the identification of historic properties and determination of Project-related effects, in accordance with 36 CFR 800, in order to comply with Section 106 of the NHPA. On June 3, 2011, the SHPO signed the MOA for the original Jordan Cove LNG import terminal and Pacific Connector sendout pipeline under Docket Nos. CP07-441-000 and CP07-444-000 regarding the resolution of adverse effects and providing for a phased approach to future investigations. If the new proposals under Docket Nos. CP13-483-000 and CP13-492-000 are approved by the Commission, we would amend the MOA, with SHPO concurrence.

The SHPO also has authorities under ORS 358-920 to issue permits for cultural resources surveys on non-federal public land, and for the excavation of archaeological sites on non-federal lands. Jordan Cove and Pacific Connector would obtain applicable permits from the SHPO prior to conducting other archaeological work related to the Project. Consultations with the SHPO and the status of compliance with the NHPA are discussed in section 4.11 of this EIS.

1.5.4.8 Oregon Department of Land, Conservation, and Development

The ODLCD assists communities and citizens in improving the built and natural environment. Under Oregon's statewide land use planning program, the ODLCD provides protection for farm and forest lands, conservation of natural resources, plans for orderly development, and coordinates among local governments. Comprehensive land use planning coordination is required under ORS 197. All cities and counties have adopted plans that meet state standards and adhere to 19 Statewide Planning Goals and Guidelines, as articulated in OAR 660-15.

In addition, NOAA has delegated to the state of Oregon the finding of consistency with the CZMA, under 15 CFR Part 930. In accordance with ORS 196.435, the ODLCD's Ocean and Coastal Services Division has been designated the state's coastal zone management agency, and administers the CZMA federal consistency review program under OAR 660-035. Applicants for certification of CZMA consistency are encouraged by the ODLCD to obtain state and local permits and other authorizations required by enforceable policies.

On August 1, 2014, Jordan Cove and Pacific Connector submitted their applications for Certification of Consistency to the ODLCD. The six-month review period regarding federal consistency provisions of the CZMA began on August 1, 2014, and will end on February 1, 2015. The CZMA consistency process is discussed in section 4.1.1.2 of this EIS.

1.5.4.9 Oregon Department of State Lands

Under Oregon's Removal-Fill Law (ORS 196-800-990), permits are issued by the ODSL for:

- projects requiring the removal or fill of 50 cubic yards or more of material in waters of the state;
- the removal or fill of any material regardless of the number of cubic yards affected in a stream designated as essential salmon habitat; and

the removal or fill of any material from the bed and banks of scenic waterways regardless of the number of cubic yards affected.

An application to the ODSL should demonstrate independent utility, best use of waters, and outline measures to minimize impacts on water resources. To meet the requirements of OAR Division 85, compensatory mitigation should be offered to replace all lost functions and values of wetlands and waterbodies impacted by a project. We discuss impacts on water resources and wetlands, and proposed measures to avoid, reduce, or mitigate those impacts in section 4.4 of this EIS.

ODSL requested the opportunity to concur with the applicants' delineations of waters of the state; this would occur as part of and jointly with the COE review. The applicants provided survey reports to ODSL in June of 2013.

The applicants would also need to obtain easements or rights-of-way to cross lands owned or managed by ODSL, including state waters. Jordan Cove indicated that it would be submitting two applications to the ODSL: (1) for the LNG terminal; and (2) another for the South Dunes Power Plant. Jordan Cove and Pacific Connector would submit its JPA to ODSL to obtain permits under the state's Joint Removal-Fill Law.

On February 19, 2013, the ODSL issued an Amended Proposed Order that would allow the dredging of Jordan Cove's proposed access channel and the portion of the marine slip in Coos Bay, under the state's Submerged and Submersible Land Easement regulations (OAR 141-122). ODSL accepted Pacific Connector's application for construction-associated dredging/disturbance in the bay under Permit Number 54484-RF on December 2, 2013. Pacific Connector submitted its application to ODSL for removal-fill permits for the remainder of the proposed pipeline route as part of its JPA with the COE.

1.5.4.10 Oregon Department of Water Resources

The mission of the ODWR is to address the state's water supply needs through the restoration and protection of stream flows and watersheds. ODWR is charged with administering state laws and regulations governing surface and groundwater resources, such as the Ground Water Act under ORS 537-505. Its core functions include collecting water resources data, and enforcing water rights, under OAR Chapter 690. All water is publicly owned in Oregon, and users must obtain a permit or water right from ODWR, including water withdrawals from underground wells, streams, or lakes.

ODWR maintains a database of water well locations, and a database for stream flows and lake levels. The applicants utilized the 2008 database for their application to FERC; however, FERC updated the analysis using the revised 2012 database.

Pacific Connector applied to the ODWR for a license for temporary use of surface waters during pipeline construction and testing. Water resources are discussed in section 4.4 of this EIS.

1.6 PUBLIC REVIEW AND COMMENTS

The environmental review of the JCE & PCGP Project began with the initiation of the FERC's Pre-filing Review Process. On February 29, 2012, Jordan Cove requested that the FERC initiate the Pre-filing Review Process for its newly proposed LNG export project, and we accepted that request on March 6, 2012, assigning it Docket No. PF12-7-000. On June 7, 2012, Pacific

Connector requested that the FERC initiate the Pre-filing Review Process for its newly proposed pipeline project, and we accepted that request on June 8, 2012, assigning it Docket No. PF12-17-000.

In their requests to initiate the Pre-filing Review Process, Jordan Cove and Pacific Connector documented that they had previously contacted stakeholders, including federal, state, and local agencies, and some non-governmental organizations, about the newly proposed projects. In addition, both companies established project-specific webpages. Jordan Cove held an Open House meeting in Coos Bay on March 27, 2013. The Open House was advertised to the public through notices published in local newspapers. FERC staff attended the Open House, and organized a site visit to the proposed LNG terminal and the planned South Dunes Power Plant.[44]

Pacific Connector held additional Open House meetings in Roseburg, Coos Bay, Klamath Falls, and Medford, Oregon during the week of June 25 through 28, 2012. Pacific Connector published notices about these Open Houses in local newspapers. FERC staff attended the Open Houses and were available to answer questions from the public.

On August 2, 2012, the FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Planned Jordan Cove Liquefaction and Pacific Connector Pipeline Projects, Request for Comments on Environmental Issues, and Notice of Public Scoping Meetings*.[45] The NOI was sent to affected landowners; federal, state, and local government agencies; elected officials; environmental and public interest groups; interested Indian tribes; and local libraries and newspapers. The NOI described the Project, listed currently identified environmental issues, outlined the proposed actions of the DOE, BLM, and Forest Service, discussed the scoping and environmental review process, announced the date, location, and time of four public scoping meetings, and explained how the public could participate and comment.

During the week of August 27-30, 2012, the FERC, BLM, and Forest Service held joint public scoping meetings in Coos Bay, Roseburg, Klamath Falls, and Medford to take comments about the Project, which were recorded by a court reporter.[46] FERC staff also conducted site visits to spots along the proposed route of the Pacific Connector pipeline and alternatives, and to the Klamath Compressor Station location on August 28 and 29, 2012.[47]

The original FERC NOI indicated that the scoping period would end on September 4, 2012. On August 28, 2012, the FERC issued a *Notice of Extension of Comment Period and Additional Public Scoping Meetings for the Jordan Cove Liquefaction and Pacific Connector Pipeline Projects*. The scoping period was extended until October 29, 2012. On September 21, 2012, the FERC issued a *Notice of Additional Public Scoping Meetings for the Jordan Cove Liquefaction and Pacific Connector Pipeline Projects*. That notice announced additional public meetings, held October 9-11, 2012 in North Bend, Canyonville, and Malin. Also on September 21, 2012,

[44] The FERC announced staff attendance at the site visit and Open House in a *Notice of Onsite Environmental Review* issued March 16, 2012. Staff notes from the site visit were placed in the FERC public record on April 17, 2012.
[45] The FERC's NOI was also published in the *Federal Register* on August 13, 2012 (vol. 77, no. 156, pp. 48138-48145).
[46] Transcripts of all of the public scoping meetings for this Project were placed into the FERC public record for the proceedings.
[47] The FERC issued a *Notice of Onsite Environmental Review* on August 10, 2012, informing the public about the site visits. Staff notes of the site visits were placed in the FERC public record on September 20, 2012.

the BLM and Forest Service published a supplemental NOI[48] that addressed Pacific Connector's application for a Right-of-Way Grant over federal lands, and proposed amendments to BLM and Forest Service District and Forest LMPs to make provisions for the pipeline.

In addition to the public notice and scoping process discussed above, the FERC staff conducted agency consultations and participated in interagency meetings with other key federal and state agencies to identify issues that should be addressed in this EIS. Five interagency meetings were held between March 2012 and April 2013: two at the BLM District Office in Roseburg on March 26, 2012, and March 12, 2013; and three meetings at the BLM District Office in Medford on June 27, August 30, and October 11 of 2012. A meeting was also held with Oregon state agencies on August 27, 2012 in Salem, organized by the ODE (see table 1.6-1). In addition, the cooperating agencies participated in bi-weekly NEPA-status telephone conference calls.[49]

TABLE 1.6-1

Public and Interagency Meetings for the JCE & PCGP Project Attended by FERC Staff

Date	Location	Purpose	Attendees
3/26/12	Roseburg, OR	Interagency Meeting	FERC, BLM, Forest Service, EPA, COE, ODEQ
3/27/12	Coos Bay, OR	Open House/Site Visit	FERC, Jordan Cove, public
6/25/12	Roseburg, OR	Open House	FERC, Pacific Connector, public
6/26/12	Coos Bay, OR	Open House	FERC, Pacific Connector, public
6/27/12	Klamath Falls, OR	Open House	FERC, Pacific Connector, public
6/27/12	Medford, OR	Interagency Meeting	FERC, BLM, Forest Service, EPA, COE, FWS, ODEQ, Coast Guard, Jordan Cove, Pacific Connector
6/28/12	Medford, OR	Open House	FERC, Pacific Connector, public
8/27/12	Coos Bay, OR	Public Scoping Meeting	FERC, BLM, Forest Service, public
8/27/12	Salem, OR	State Agency Meeting	FERC, BLM, Forest Service, ODE, ODA, ODFW, ODSL, ODLCD, DAGAMI, SHPO, ODOT, Oregon Department of Justice, and Oregon Governor's Office
8/28/12	Roseburg, OR	Public Scoping Meeting	FERC, BLM, Forest Service, public
8/28/12	Douglas County, Oregon	Site Visit	FERC, BLM, Forest Service, Cow Creek Tribe, Pacific Connector, public
8/29/12	Klamath Falls, OR	Public Scoping Meeting	FERC, BLM, Forest Service, Reclamation, public
8/29/12	Malin, OR	Site Visit	FERC, Pacific Connector, public
8/30/12	Medford, OR	Public Scoping Meeting	FERC, BLM, Forest Service, public
8/30/12	Medford, OR	Interagency Meeting	FERC, BLM, Forest Service, Reclamation, NMFS, FWS, COE, Pacific Connector, public
10/9/12	North Bend, OR	Public Scoping Meeting	FERC, BLM, Forest Service, public
10/10/12	Canyonville, Or	Public Scoping Meeting	FERC, BLM, Forest Service, public
10/11/12	Malin, OR	Public Scoping Meeting	FERC, BLM, Forest Service, Reclamation, public
10/11/12	Medford, OR	Interagency Meeting	FERC, BLM, Forest Service, Reclamation, EPA, COE, Jordan Cove, Pacific Connector
3/12/13	Roseburg, OR	Interagency Meeting	FERC, BLM, Forest Service, Reclamation, EPA, COE, FWS, Coast Guard, Jordan Cove, Pacific Connector

Throughout the Pre-filing Review Process, we received comments on a wide variety of environmental issues. Between March 6, 2012, when pre-filing was initiated for the Jordan Cove Project, and August 2, 2012, when we issued our NOI, the FERC received 7 letters. From August 3, 2012, to October 29, 2012 (the end of the announced scoping period), we received 170 discrete documents commenting on the Project, including 130 letters from individuals,[50] 26 letters from non-governmental organizations, 5 letters from federal agencies, 4 letters from state

[48] *Federal Register* (vol. 77, no. 184, pp. 58570-58575).
[49] Staff notes for all interagency meetings and the bi-weekly NEPA-status telephone conference calls have been placed into the FERC public record for these proceedings.
[50] Not including form letters.

and local agencies, 3 letters from private companies, and 2 letters from members of the U.S. Congress. In addition, 429 form letters were filed. Between October 30, 2012, and September 30, 2014 (when much of the text for this EIS was written), the FERC received an additional 26 comment letters. All comments received prior to the writing of this EIS were considered and we addressed all relevant environmental topics included in the analysis.

Table 1.6-2 categorizes the relevant environmental issues raised in letters to the FERC prior to our writing this EIS. The table does not account for the out-of-scope issues discussed above in section 1.4.4. The most frequently mentioned environmental topics were impacts on biological resources; safety and security; FERC's approach to the NEPA process; and socioeconomics.

TABLE 1.6-2

Environmental Issues Identified During the Pre-filing Public Scoping Process for the JCE & PCGP Project

Specific Issue/Comment	EIS Section Where Comments are Addressed
Purpose and Need (3 percent of comments)	**1.0**
Project Description (3 percent of comments)	**2.0**
Life of Project, decommissioning	
Concerns over temporary work areas (TEWAs), uncleared storage areas	
BLM, Forest Service, and FERC process	
Alternatives (6 percent of comments)	**3.0**
Comments urging that investments be redirected towards renewable, domestic energy sources such as wind, solar and wave power.	
Request rigorous analysis of pipeline route alternatives (evaluate more than action/no-action)	
Geologic Hazards (5 percent of comments)	**4.2**
Regional seismic activity (earthquake and/or tsunami) on the export terminal or pipeline.	
Soils and Minerals (2 percent of comments)	**4.3**
Concerns over erosion of sensitive soils.	
Sedimentation of streams as a result of soil disruption	
Soil and slope stability along the pipeline route.	
Water Resources (8 percent of comments)	**4.4.1**
Impacts of construction and operation of the project elements, including export terminal facilities and pipeline crossings, on surface water and groundwater, including drinking water and salmon spawning habitat, and especially that of the Rogue River.	
Concerns over horizontal directional drilling under streams and rivers along the pipeline route.	
Concerns over hydrostatic testing of the pipeline.	
Wetlands and Riparian Areas (1 percent of comments)	**4.4.2**
Impacts to sensitive wetlands in the vicinity of the export terminal and pipeline.	
Biological Resources (13 percent of comments)	**4.6 and 4.7**
Impacts to threatened and endangered species.	
Impacts to fisheries and EFH.	
Impacts to wildlife habitat, including connectivity.	
Impacts of pipeline construction on forestlands, including sensitive forest types.	
Introduction and propagation of noxious weeds in the pipeline right-of-way.	
Land Use and Recreation (25 percent of comments)	**4.1 and 4.8**
Location of access roads, hydrostatic test locations, uncleared storage areas, cleared areas.	
Impact on recreational opportunities, recreation-based tourism.	
Opposition to use of eminent domain to acquire pipeline easements, especially when some land uses would not be allowed or practicable once the pipeline is installed.	
Comments supporting and opposing the use of federal lands for the pipeline corridor.	
Comments making specific pipeline alignment adjustments (generally to avoid private properties, also to avoid resources.	
Concerns over BLM and Forest Service LMP revisions.	
BLM and Forest Service Plan Revisions, and associated mitigation/restoration requirements	
Visual Resources (1 percent of comments)	**4.8**
Concerns over specific views, typically from private properties.	
Socioeconomics (10 percent of comments)	**4.9**
Comments supporting and opposing the creation of local jobs; reconcile with environmental impacts and safety risks involved.	
Impacts to the local economy, including anticipated drop in tourism (fishing, birding).	
Concerns over application of eminent domain.	
Concerns over decreased property values.	

TABLE 1.6-2

Environmental Issues Identified During the Pre-filing Public Scoping Process for the JCE & PCGP Project

Specific Issue/Comment	EIS Section Where Comments are Addressed
Transportation (1 percent of comments)	**4.10**
Impacts, risks of proximity to the Southwest Oregon Regional Airport.	
Cultural Resources (2 percent of comments)	**4.11**
Impacts to tribal lands and lands traditionally used by tribal members, especially fishing.	
Request outreach to the tribes.	
Air Quality and Noise (4 percent of comments)	**4.12**
Impacts to climate change, both as direct impact of the South Dunes power plant as well as the eventual consumption of the natural gas transported by the pipeline.	
Concerns over operations emissions of the LNG vessels and terminal on local communities (respiratory health).	
Safety and Security/Public Health/Monitoring and Accountability/Siting (15 percent of comments)	**4.13**
Risk of catastrophic events, either accidental, intentional (terrorism) or as a result of a natural disaster on the export terminal, LNG vessels or the pipeline.	
Availability and readiness of emergency response personnel in the event of a catastrophic incident, especially in remote areas.	
Concerns over the health impacts of spilled or leaked gas on nearby communities.	
Emergency response planning (tsunami, earthquake).	
Concerns over pipeline weakness, potential for leak or explosion leading to wildfire.	
Concerns over rural pipeline safety, including non-odorized gas and construction standards.	
Monitoring and mitigation; accountability and responsibility.	
Cumulative Impacts (1 percent of comments)	**4.14**
Impacts of increased marine traffic.	
Impacts from other energy projects.	

The Pacific Connector Pipeline Project was previously proposed to transport imported natural gas (FERC Docket No. CP07-441-000). On June 15, 2009, the Forest Service published an NOI (74 [113] FR 27214–28217) for proposed LRMP amendments related to that proposal. Most of the proposed amendments associated with FERC Docket No. CP07-441-000 remain largely unchanged because the current Pacific Connector Pipeline Project follows nearly the same route on NFS lands. Comments received by the Forest Service in response to the Forest Service NOI published in 74 FR 27214–28217 were considered by the Forest Service in this scoping process if they were related to the current proposed forest plan amendments. A total of 77 comments were received by the Forest Service between June 15 and July 31, 2009, in response to the June 2009 Forest Service NOI and were considered by the Forest Service in the analysis in this EIS of environmental consequences of the Pacific Connector Pipeline Project on NFS lands.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action consists of the activities outlined by Jordan Cove and Pacific Connector in their applications to the FERC. The proposed facilities are more fully described in section 2.1 below.

This EIS addresses all facilities associated with the JCE & PCGP Project. That includes facilities that come under the jurisdiction of the FERC and some that do not. The non-jurisdictional facilities include the South Dunes Power Plant that would serve the Jordan Cove terminal, the SORSC, the ships used for maritime transport of LNG, and various utility services to aboveground facilities along the Pacific Connector pipeline.

2.1 PROJECT COMPONENTS

The main Project components consist of Jordan Cove's LNG export terminal and Pacific Connector's pipeline and ancillary facilities. Chapter 4 of this EIS addresses specific environmental resources that may be potentially impacted by construction and operation of the proposed facilities.

2.1.1 Jordan Cove LNG Terminal

Jordan Cove proposes to construct and operate a new LNG export terminal on the bay side of the North Spit of Coos Bay, Oregon. The general location of the terminal is shown on figure 2.1-1. As listed in section 1.1.2 of this EIS, the main components of Jordan Cove's LNG export terminal include a connection to the Pacific Connector pipeline and gas processing plant, an electric power plant and utility corridor, four liquefaction trains, two full-containment LNG storage tanks, a transfer pipeline to the berth, loading facilities at the berth, a marine slip, and an access channel for LNG vessels. The main facilities at the LNG terminal are shown on figure 2.1-2. In addition, there is a discussion of the disposal of excavated and dredged materials, wetlands preservation and mitigation areas, and temporary construction use areas and staging areas, and a temporary construction workers camp.

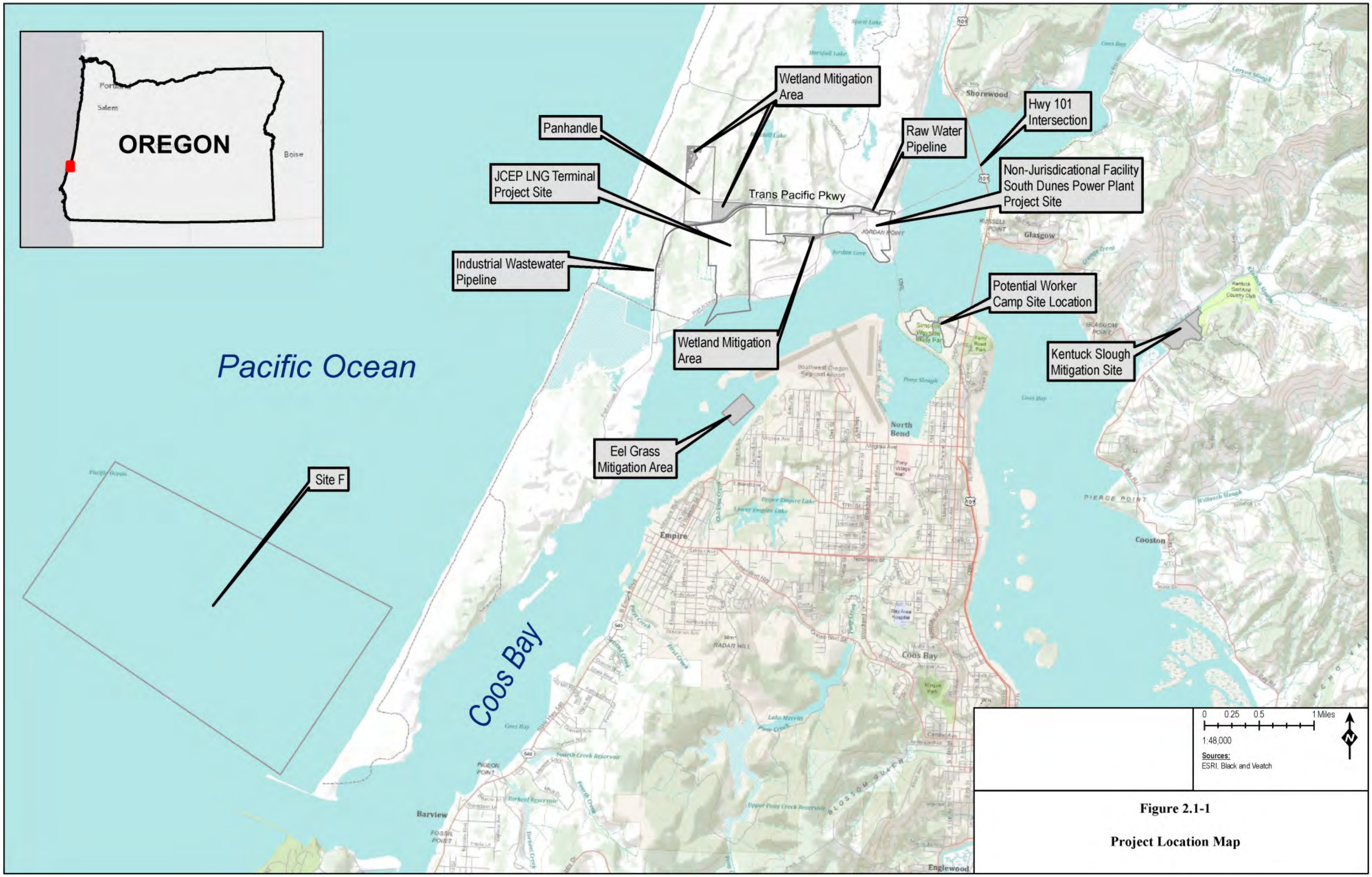
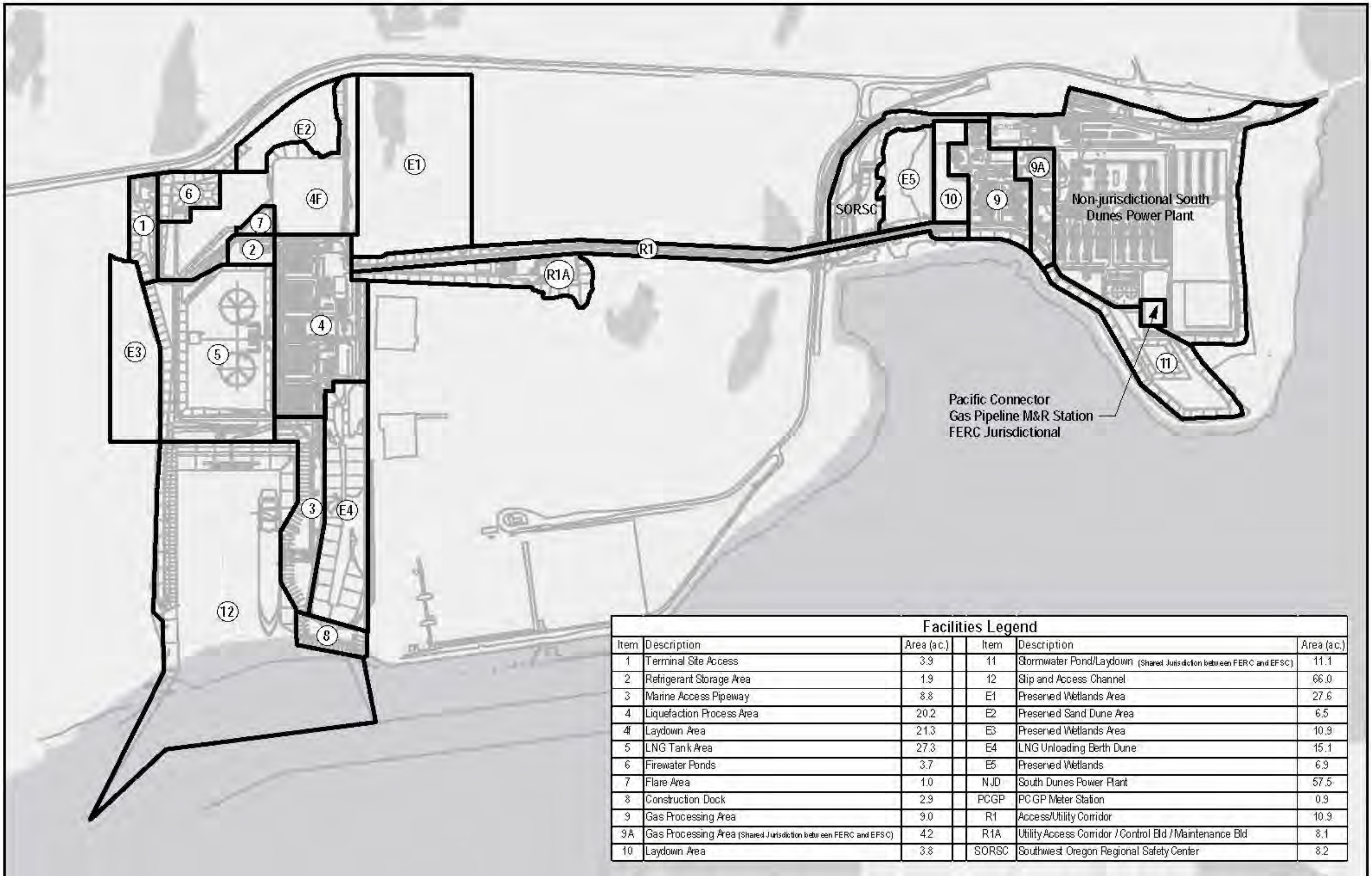


Figure 2.1-1

Project Location Map



Facilities Legend

Item	Description	Area (ac.)		Item	Description	Area (ac.)
1	Terminal Site Access	3.9		11	Stormwater Pond/Laydown (Shared Jurisdiction between FERC and EFSC)	11.1
2	Refrigerant Storage Area	1.9		12	Slip and Access Channel	66.0
3	Marine Access Pipeway	8.8		E1	Preserved Wetlands Area	27.6
4	Liquefaction Process Area	20.2		E2	Preserved Sand Dune Area	6.5
4f	Laydown Area	21.3		E3	Preserved Wetlands Area	10.9
5	LNG Tank Area	27.3		E4	LNG Unloading Berth Dune	15.1
6	Firewater Ponds	3.7		E5	Preserved Wetlands	6.9
7	Flare Area	1.0		NJD	South Dunes Power Plant	57.5
8	Construction Dock	2.9		PCGP	PCGP Meter Station	0.9
9	Gas Processing Area	9.0		R1	Access/Utility Corridor	10.9
9A	Gas Processing Area (Shared Jurisdiction between FERC and EFSC)	4.2		R1A	Utility Access Corridor / Control Bld / Maintenance Bld	8.1
10	Laydown Area	3.8		SORSC	Southwest Oregon Regional Safety Center	8.2

Figure 2.1-2
LNG Terminal Facilities

Source:
Black and Veatch

2.1.1.1 LNG Marine Traffic

The Coast Guard defines the waterway for LNG marine traffic for the Jordan Cove Project as extending from the outer limits of the United States territorial waters, 12 nautical miles off the coast of Oregon, and 7.5 nautical miles up the Coos Bay navigation channel to the proposed location of the Jordan Cove LNG terminal (figure 2.1-3). The federally maintained Coos Bay navigation channel extends from the mouth of Coos Bay to the city of Coos Bay Docks at about navigation channel mile (NCM) 15.1 (figure 2.1-4). For the analysis in this EIS and the corresponding BA and EFH Assessment specific to species covered by the ESA and MSA, we also considered impacts from LNG marine traffic extending out to the economic exclusion zone (EEZ).

Jordan Cove estimated that it would take an LNG vessel between 1.5 hours (at 6 knots) and 2 hours (at 4 knots) to travel through the waterway from the "K" Buoy to the terminal. An additional 90 minutes would be necessary for the LNG vessel to be turned in the access channel and parked at the terminal berth, with the assistance of tug boats. The entire round-trip transit time for a single LNG vessel to travel from the K Buoy through the waterway, turn and dock at the berth, take on a full cargo of LNG, and then exist the terminal slip and travel through the waterway back out to the open ocean past the K Buoy would be about 22 hours.

2.1.1.2 Access Channel

An access channel would connect the existing Coos Bay navigation channel with the Jordan Cove LNG terminal marine slip (figure 2.1-5). The access channel would begin at the confluence between the Jarvis Turn and the Upper Jarvis Range at about NCM 7.5 along the Coos Bay navigation channel. The access channel would be about 2,300 feet wide at the navigation channel and about 800 feet wide at the mouth of the proposed slip. The distance from the north edge of the navigation channel to the mouth of the slip would be about 700 feet. The walls of the access channel would be sloped to meet the existing bottom contours at an angle of 3 feet horizontal to one foot vertical. The access channel would be approximately 45 feet deep.

The access channel would cover about 30 acres below the mean higher high water (MHHW) line. Dredging of the access channel would affect about 15.2 acres of currently existing deep subtidal below -15.3 feet in depth; about 5.8 acres of existing shallow subtidal to the MLLW line; and about 8.1 acres of existing intertidal strata between the MHHW and MLLW lines. Details about dredging and the disposal of dredged materials are discussed in section 2.1.1.12 below.

The access channel would be within state waters in Coos Bay managed by the ODSL. Jordan Cove would construct the access channel and the marine slip at its proposed LNG terminal. After construction, Jordan Cove would transfer responsibility for maintenance of the access channel and marine slip to the Port. The Port has already obtained an easement from ODSL for operation and maintenance of the access channel and the in-water portion of the slip.[1] Jordan Cove would reimburse the Port for costs associated with its operation and maintenance of the access channel and slip.

[1] The ODSL issued an Amended Proposed Order for the access channel and in-bay portion of the slip on February 19, 2013.

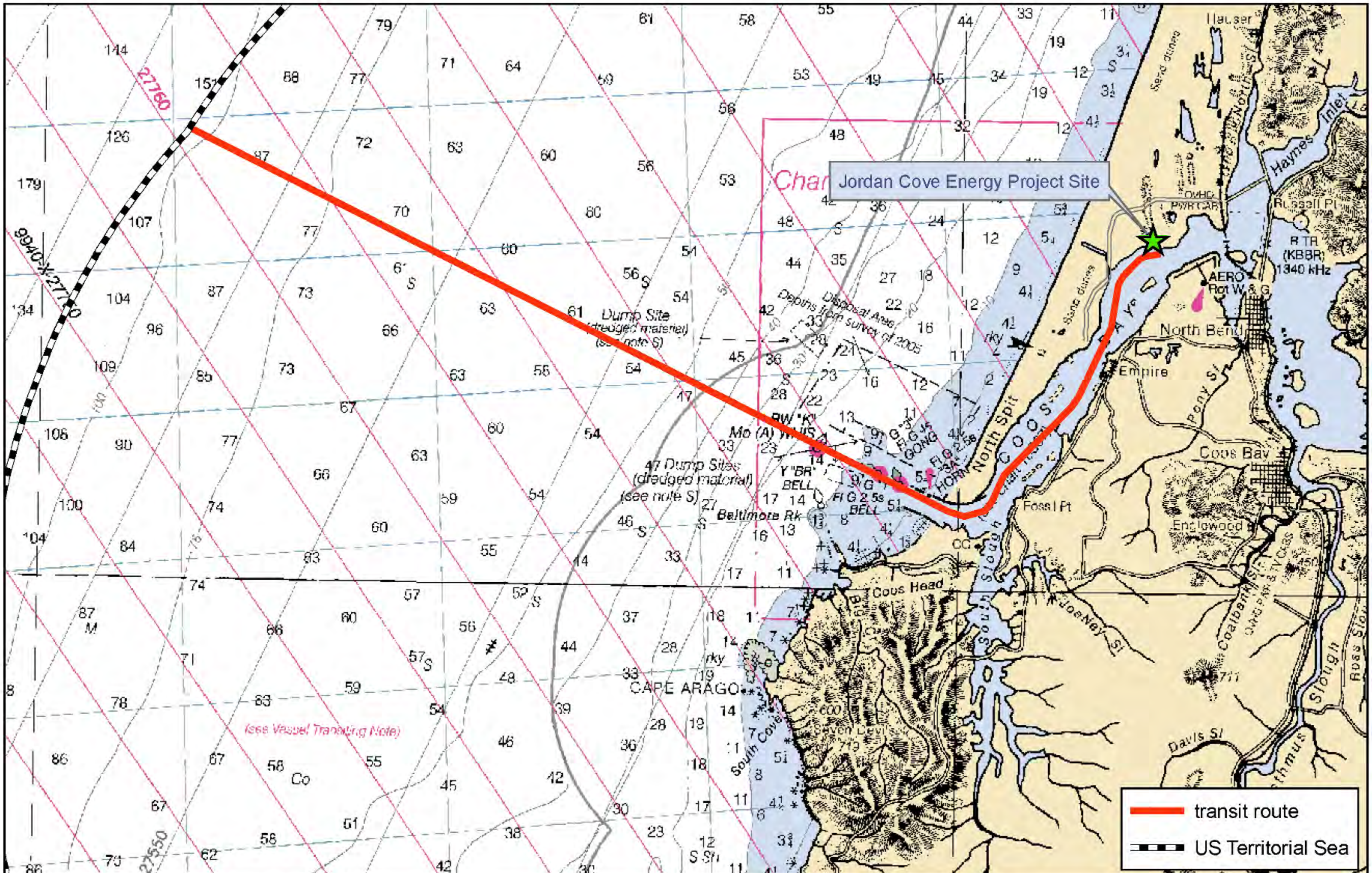


Figure 2.1-3

Proposed LNG Vessel Transit Route

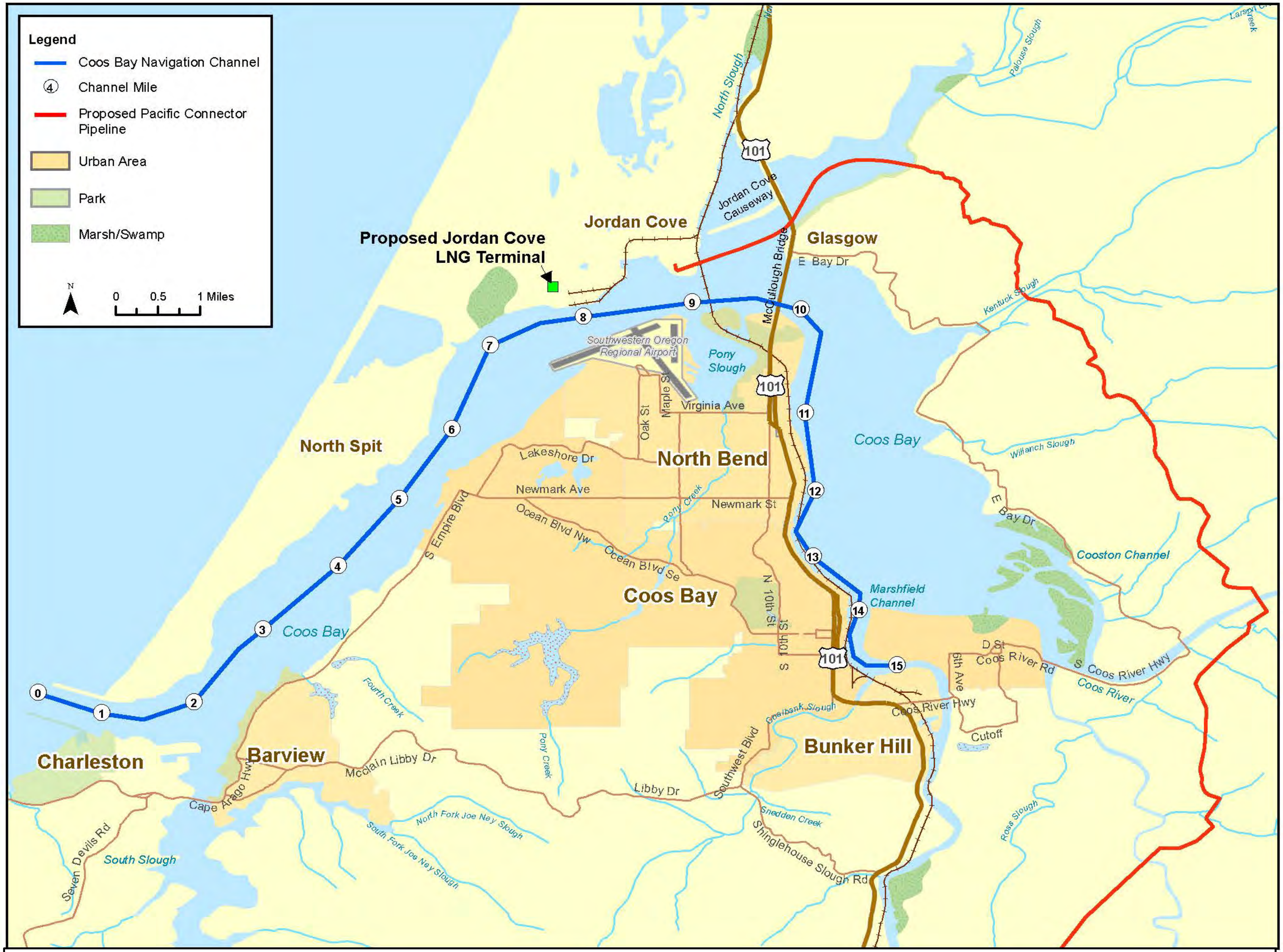


Figure 2.1-4. Coos Bay Navigation Channel and Other Features in the Vicinity of the Proposed LNG Terminal

Figure 2.1-5

Plot Plan of the Marine Facilities

2.1.1.3 Marine Slip and Berths

Jordan Cove would construct the marine slip at its proposed LNG terminal, at the north end of the access channel. Part of the marine slip would be constructed within state-waters of Coos Bay to the MLLW line, for which the Port has obtained an easement from the ODSL. The majority of the terminal marine slip would be excavated from current uplands owned by Jordan Cove. The upland portion of the proposed marine slip would cover about 36 acres (see Area 12 on figure 2.1-2).

The inside dimensions at the toe of the slope of the slip would measure approximately 800 feet along the north boundary and approximately 1,500 feet and 1,200 feet along the western and eastern boundaries, respectively. The minimum water depth within the slip would be -45 feet NAVD88 (North American Vertical Datum of 1988). The northern side of the slip would be constructed at three feet horizontal to one foot vertical.

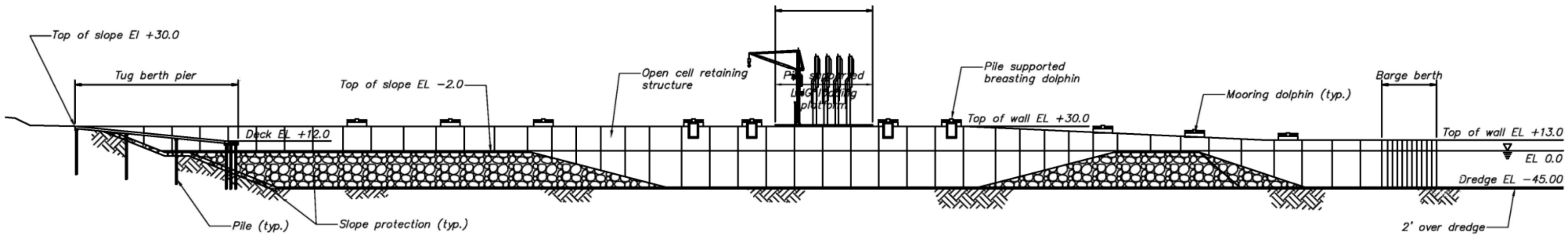
About 4.3 million cubic yards (mcy) of material would need to be removed to create the slip basin. Of this, about 2.3 mcy would be dry excavated and about 2.0 mcy would be hydraulically dredged. The excavated and dredged materials would be transported to the planned location of the South Dunes Power Plant, where they would be used to raise the elevation of that site. Section 2.1.1.12 provides more details about the dredging operations and disposal of materials.

The terminal slip would contain an LNG berth on the east side, and a berth for tugboats and escort ships on the north side. After construction, Jordan Cove would convey the operation and maintenance of the marine slip to the Port, and reimburse the Port the costs of those activities. Jordan Cove would enter into an exclusive lease with the Port for the water surface on the west side of the slip to prevent any incompatible future development activity. A developer would have to seek permission from Jordan Cove for any future use of the west side of the slip. No request for such a use has been received to date by the company. A berm would be constructed between the western edge of the slip and Henderson Marsh. The berm would isolate and protect Henderson Marsh from project-related construction and operational activities, and effectively preclude development of the west side of the slip.

LNG Vessel Berth and Loading Platform

An LNG vessel berth would occupy the eastern side of the slip. Although the slip and berth could accommodate LNG vessels as large as 217,000 m^3 in capacity in the future, at present the Coast Guard LOR and WSR would only allow LNG vessels up to 148,000 m^3 in capacity to dock at the terminal.

The LNG vessel berth would consist of open cell sheet pile technology developed and patented by PND Engineers, Inc. (figure 2.1-6). A similar berth design was constructed at the Sabine Pass LNG terminal in Cameron Parish, Louisiana. The open cell sheet piling would allow LNG vessels to be moored about one meter from the side of the slip. This change in design eliminated the need for a dock supported by piles extending from shore into the marine slip to the vessel, as previously proposed for the original Jordan Cove LNG import terminal in Docket No. CP07-444-000. For the new berth, all of the piles would be installed land-side, with the mooring dolphins located onshore and the breasting dolphins attached to the front of the concrete loading platform. The total number of battered steel piles required for the vessel berth and loading platform combined would be 112, as listed below on table 2.1.1.3-1. The battered steel piles would be driven, to a depth of refusal, while the marine slip is isolated from the bay by a berm. The piles would support surface structures (i.e., the loading platform), or provide the foundation for the breasting and mooring dolphins.



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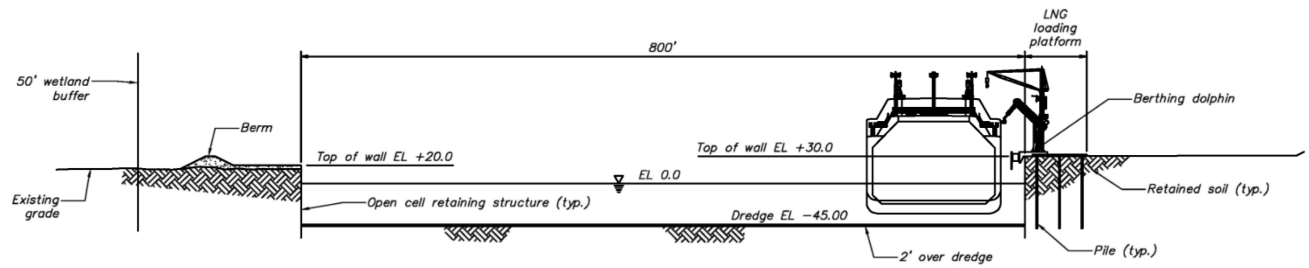

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Sources: David Evans &Associates, Inc.

Figure 2.1-6
Plot Plan of Marine Berth

TABLE 2.1.1.3-1

Piles Supporting the LNG Vessel Berth and Loading Platform

Facility	Number of Piles	Diameter of Piles & Wall Thickness
Mooring Dolphins	48	30-inch-diameter & 1-inch wall thickness
Breasting Dolphins	32	30-inch-diameter & 1-inch wall thickness
Loading Platform	32	24-inch-diameter & 5/8-inch wall thickness

The LNG vessel berth would be about 1,249 feet long between the centers of the end mooring dolphins, and 182 feet wide from the center of the mooring dolphins to the edge of the breasting dolphins. The loading platform would be installed directly above the vessel berth, and would be about 120 feet long and 60 feet wide. The top of the LNG vessel loading platform would be at an elevation of 30 feet. Combined, the vessel berth and loading platform would occupy 15 acres of uplands.

The vessel cargo loading facilities would consist of three 16-inch-diameter loading arms, and one 16-inch-diameter vapor return arm, installed on a concrete base of the platform slab deck (figure 2.1-6). Space would be provided for one additional LNG loading arm. A mezzanine type elevated platform above the concrete support deck would be constructed of steel. The main concrete lower platform level would contain curbs for and sloped to contain spills. The two middle arms would be piped for dual service capable of loading LNG to the ships or returning vapor to the storage tanks. The loading arms would be designed with swivel joints to provide the required range of movement between the ship and the shore connections. Each arm would be fitted with a hydraulically interlocked double ball valve and powered emergency release coupling (DBV/PERC) to isolate the arm and the ship in the event of an emergency condition where rapid disconnection of connected arms is required. Each arm would be fully balanced in the empty condition by a counterweight system and maneuvered by hydraulic cylinder drives.

The LNG cargo loading arms would be designed for a design loading rate of 10,000 m^3/hr. Additional structures at the vessel berth and loading platform would include a ship gangway, area lighting facilities, aids to navigation , firewater monitors, and a dry chemical firefighting system.

Tug and Sheriff Boat Berth

On the north side of the marine slip would be a berth that could accommodate three tugboats and three Sheriff's escort boats. This dock would be about 480 feet long and 18 feet wide. It would be supported by 98 battered steel piles as listed below in table 2.1.1.3-2. The piles would be driven, to a depth of refusal, while the slip is isolated from the bay. Included as part of the dock would be two boat houses. North of the dock would be a tug operator building.

TABLE 2.1.1.3-2

Piles Supporting the Tug Boat Berth

Tug Boat Dock Facility	Number of Piles	Diameter of Piles & Length of Structure
Pier Structure	44	24-inch-diameter & 5/8-inch wall thickness
Pier Fender Structure	28	12-inch-diameter by 55 feet
Pier Corner Fenders	10	12-inch-diameter by 65 feet
Floating Pier/Boat House	16	24-inch-diameter & 5/8-inch wall thickness

2.1.1.4 LNG Transfer Line

LNG would be fed from the LNG storage tanks to the LNG vessel loading facilities through one 2,300-foot-long, 36-inch-diameter cryogenic transfer line ("marine access pipeway"). The area occupied by the transfer pipeline would cover close to 9 acres of uplands (see Area 3 on figure 2.1-2).

2.1.1.5 LNG Storage Tanks

Once the liquefaction process is complete, the LNG would be stored in two full-containment LNG storage tanks, each designed to store 160,000 m^3 (1,006,000 barrels) of LNG at an approximate temperature of -260°F and atmospheric pressure. Each LNG storage tank would consist of a primary nine percent nickel inner steel container and a secondary post-stressed concrete outer container wall. These tanks would be designed so that both the primary inner container and the secondary outer concrete shell are capable of independently containing the stored LNG.

The two LNG storage tanks and surrounding storm surge barrier would occupy an area of about 27 acres within the terminal processing area, just north of the marine slip (see Area 5 on figure 2.1-2). The base elevation of the storage tanks would be at about +30 feet above mean sea level (MSL). The top of the dome of a tank would be about 180 feet above grade, and the diameter of the outer tank would be about 267 feet wide. Jordan Cove proposes to enclose the LNG storage tanks within an earthen berm or storm surge barrier that would be about +60 feet high. The storm surge barrier would be designed to contain the contents of one 160,000 m^3 storage tank.

The final design and supplier for the LNG storage tanks have not yet been selected by Jordan Cove. The conceptual preliminary design of all facility features is discussed in section 4.13.2 of this EIS. In general, each LNG storage tank would consist of the following elements:

- 9 percent nickel steel open top inner primary container;
- carbon steel liner around the primary container;
- concrete domed roof;
- insulated aluminum deck over the inner container suspended from the roof;
- reinforced concrete bottom slab with pedestals and seismic isolators;
- reinforced concrete tank base slab with carbon steel liner plate; and
- reinforced post-tensioned concrete wall and reinforced concrete roof on the secondary outer container.

Each storage tank would be built on a reinforced concrete slab foundation. The soil beneath the foundation would be improved using methods defined during subsequent geotechnical studies for the final design (see section 4.3 for more details about ground improvement based on geotechnical studies to meet seismic design standards). Base heating would not be necessary, as the tank base slab would be elevated. The load-bearing insulation on top of the base, beneath the inner storage tank container, would be cellular glass, capable of supporting the weight of the inner container and LNG.

The exterior walls of the outer container would be of reinforced concrete, lined with a butt-welded compression ring and welded steel plates, and a reinforced concrete dome poured over a carbon steel framework. The inner liner of the outer container would be carbon steel, while the bottom corner protection would be 9 percent nickel steel. The carbon steel inner liner would serve as a barrier to moisture migrating from the outside atmosphere to the insulation between the containers, and would also prevent vapor from escaping from the inner container during normal operations. An aluminum deck, would be suspended from the outer roof by hangers made of stainless steel. The top surface of the deck would be insulated with fiberglass. The outer tank roof and vapor space about the suspended deck would be at ambient temperature.

The space between the inner and outer containers would be insulated with expanded perlite to keep the stored LNG at a temperature of approximately -260°F while maintaining the outer container at near ambient temperature. There would be no penetrations through the inner container or outer container sidewall or bottom below the maximum liquid level. All piping into and out of the tank would enter from the top of the tank. A conceptual design drawing of a typical full containment LNG storage tank is illustrated in figure 2.1-7.

2.1.1.6 Liquefaction Process

Once the feed gas is treated, it would then be sent to four parallel trains of a liquefaction process. The process utilizes a single mixed refrigerant circuit with a two-stage compressor and a refrigerant exchanger. The conditioned gas, at 745 pounds per square inch gauge (psig) and 95°F, is divided equally among the four liquefaction trains.

The refrigerant exchanger consists of 10 brazed aluminum cores arranged in a cold box. The cores are installed vertically inside the cold boxes. The refrigeration is supplied by a closed loop refrigeration cycle in which the refrigerant is compressed, partially condensed, cooled, expanded, and then heated as it supplies refrigeration and flows back to the compressor.

Low pressure refrigerant is compressed in a refrigerant compressor and is cooled by a refrigerant condenser and flows to a refrigerant discharge separator. The partially condensed refrigerant is separated into vapor and liquid in this vessel. The high-pressure refrigerant vapor and liquid from the refrigerant discharge separator flow through separate lines to the cold box. The vapor and liquid are recombined internally in the cold box as they enter each of the brazed aluminum cores.

The high pressure refrigerant flows downward through the cold box and exits each core from the bottom, totally condensed and sub-cooled. It then flows through a Joule-Thompson valve, reducing the pressure. This pressure reduction causes some vaporization of refrigerant, reducing the temperature further. This cold, low-pressure refrigerant reenters the cold box at the cold end and flows upward, removing heat from the feed gas and high pressure refrigerant streams in the exchanger as it vaporizes. The low-pressure refrigerant from the cold box then flows back to the refrigerant compressor inlet.

LNG exits the four trains at 730 psig and -245°F and is directed to an LNG expander where electricity is generated while the pressure is reduced to 30 psig. The LNG is then sent through a second expansion where the pressure is reduced to 1 psig. This expansion lowers the LNG temperature, but also causes approximately 5 percent (volume basis) of the LNG to be vaporized. The two-phase stream exits the valve at around -260°F and would then be sent to the LNG storage tanks.

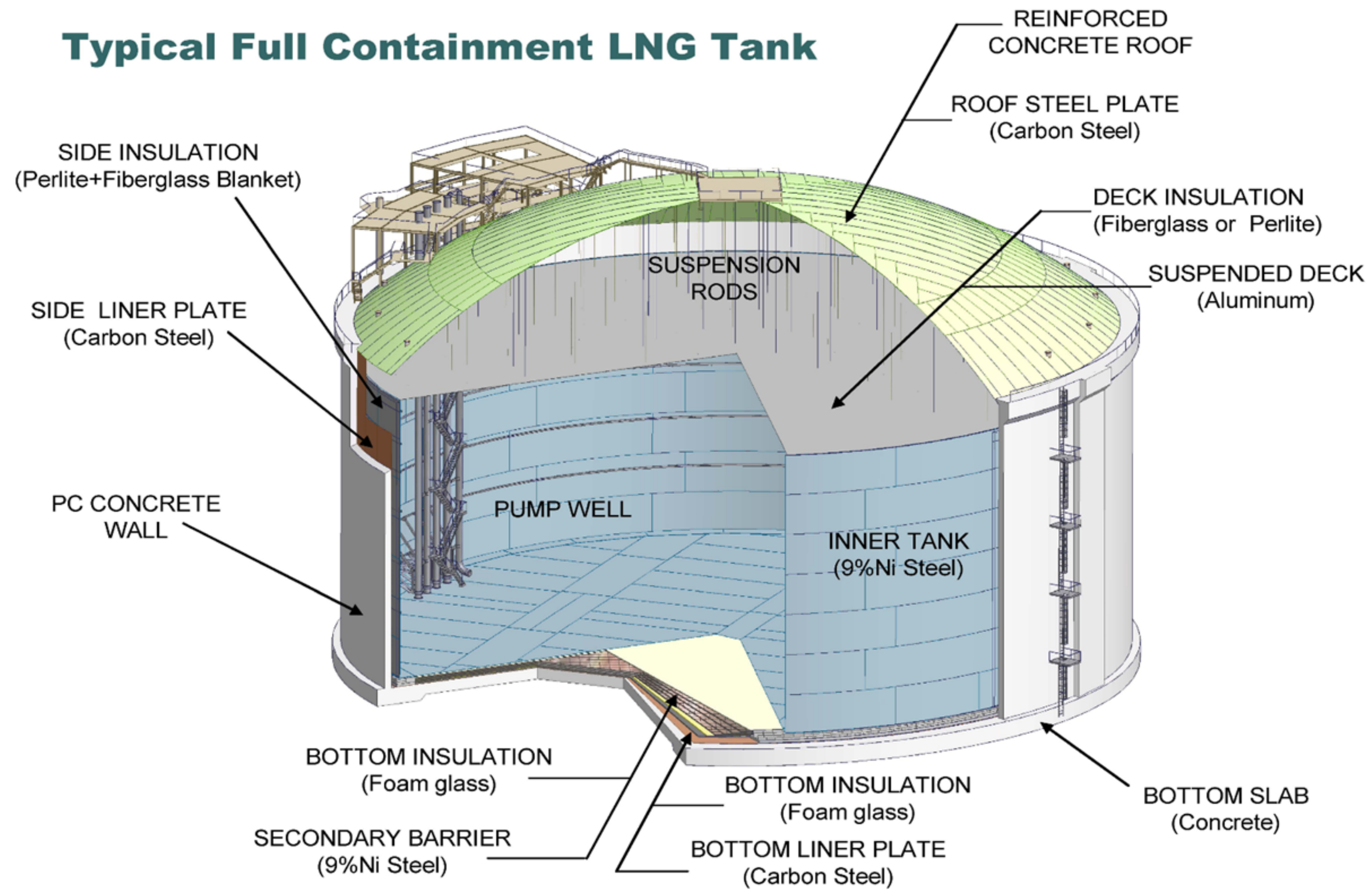


Figure 2.1-7

Conceptual Design of the LNG Storage Tanks

The four liquefaction trains process area would cover about 20 acres within the terminal tract (see Area 4 on figure 2.1-2). Jordan Cove indicated that the process area would be at an elevation of about +46 feet. The LNG would be conveyed from the liquefaction trains to the storage tanks via piping.

2.1.1.7 Refrigerant Makeup System

During operation, the refrigeration loop components would be replenished periodically. Three of the hydrocarbon refrigerants used in the four closed-loop trains cannot be generated on-site: ethylene, propane and isopentane. These components would be delivered to and stored in pressure vessels on site. At a minimum, the stored refrigerant capacity is equal to the estimated loss of refrigerant from one train in a year of continuous operation. Refrigerants would be stored in bullet-type vessels located in the refrigerant storage area as shown on figure 2.1-5. The ethylene bullet would be approximately 144 inches in diameter and 28 feet in length. The propane bullet would be approximately 132 inches in diameter and 26 feet in length. The isopentane bullet would be approximately 144 inches in diameter and 40 feet in length. The refrigerant storage area would occupy about 2 acres just north of the LNG storage tanks (see Area 2 on figure 2.1-2).

2.1.1.8 Gas Conditioning Plant

Pacific Connector would bring natural gas through its pipeline from near Malin, Oregon, to the Jordan Cove terminal, where it would construct and operate a meter station connecting with the Jordan Cove facility. Once the natural gas is transferred to Jordan Cove, it would go through a treatment plant, situated within an approximately 13-acre area on the west side of the South Dunes Power Plant (see Areas 9 and 9A on figure 2.1-2). The elevation of the gas pretreatment facility would be about +40 feet.

The pipeline natural gas conditioning facility would consist of two feed gas pre-treatment trains with a combined throughput of 1 Bcf/d. Feed gas would enter the facility at 800 psig and 86°F, at a rate of 461 million cubic feet per day (MMcf/d) per train.

The gas conditioning units would remove substances that would freeze during the liquefaction process, namely CO_2 and water. Mercury would also be removed to prevent corrosion in downstream equipment. Trace amounts of hydrogen sulfide (H_2S) would be removed as well in the CO_2 removal system, due to the characteristics of the absorbent employed. The pipeline gas conditioning unit consists of two parallel trains, each containing two systems in series: a CO_2 removal process which utilizes a primary amine to absorb CO_2, followed by a dehydration system which uses two distinct solid adsorbents to remove water and mercury from the feed gas.

2.1.1.9 Utility Corridor, Haul Road, Access Roads, and Parking Lots

A new utility corridor would be constructed between the LNG terminal tract and the planned South Dunes Power Plant. The corridor would be approximately one mile in length and 150 feet wide (toe of slope to toe of slope). It would be located entirely on property owned by Jordan Cove. The utility corridor would cover about 11 acres (see Area R1 on figure 2.1-2).

The corridor would be utilized initially during construction for the movement of equipment and materials, then during operations for control of access to the terminal. Use of the corridor for construction traffic and access to the LNG terminal would reduce impacts on the Trans-Pacific Parkway and the existing Roseburg Forest Products facility.

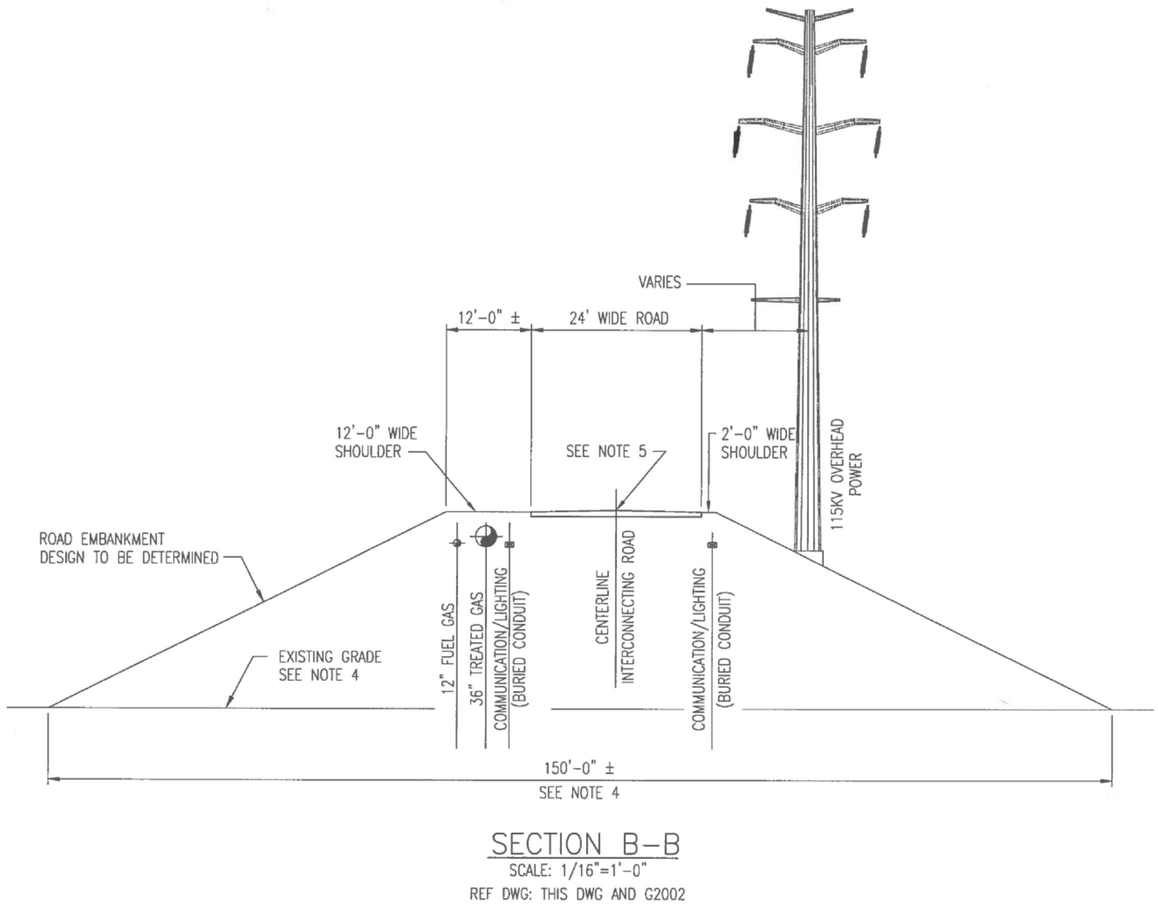
The utility corridor would include a two lane 24-foot-wide roadway, with 12-foot-wide shoulder and bridge structures to reduce impacts to wetlands and to fly-over the access road and rail spur serving the Roseburg Forest Products facility. Additionally, the corridor would contain overhead 230 kV power transmission lines and an underground pipe way corridor that includes the feed gas supply to the LNG Terminal, a fuel gas pipeline to the South Dunes Power Plant, backup pilot gas line, telecommunications lines and redundant control circuitry (see figure 2.1-8).

A temporary heavy equipment haul road would be utilized during terminal construction, extending from the construction dock on the east side of the marine slip to the planned South Dunes Power Plant tract. It would cross the Roseburg Forest Products parcel. The haul road would be about 5,925 feet long, 60 feet wide, and cover about 8 acres (see figure 2.1-9). The road would be used to haul materials excavated from the upland portions of the marine slip to the South Dunes Power Plant area.

Another terminal access road would be located within an approximately 4-acre area in the northwestern portion of the tract (Area 1 on figure 2.1-2). This road would extend from the Trans-Pacific Parkway south through the terminal tract to the slip. It would be 25 feet in width and 995 feet long, with 11-foot-wide asphalt paved lanes and 1.5-foot-wide aggregate shoulders. During construction of the terminal, this road would be used for material deliveries and access to the concrete batch plant. During terminal operations, this road would serve mainly for emergency situations, or for occasional deliveries or maintenance activities.

Permanent operational roads within the terminal complex would be graveled or asphalt surfaced. Roads within the liquefaction area would be about 46 feet wide. Roads within the South Dunes Power Plant area would be about 40 feet wide.

There would be internal permanent operational parking lots. One employee parking lot would be on top of existing Landfill Cell #2, north of the South Dunes Power Plant, east of the South Dunes Administrative Building. The SORSC would have its own parking lot on its north side, east of Jordan Cove Road. Other parking lots would be associated with the Liquefaction Plant and Maintenance Building and Control Building, on the south side of the utility corridor, north of the Roseburg Forest Products property, to the east of the LNG terminal process area.



Source:
Black and Veatch

Figure 2.1-8
Cross Section Drawing of Access Road and Utility Corridor

Figure 2.1-9

Truck Haul/Hydraulic Transport Pipeline Route

2.1.1.10 Other Terminal Support Systems

Jordan Cove would have to install a number of other utilities and systems within its LNG terminal tract to support its liquefaction and LNG delivery functions. These other systems include vapor handling, vent stacks and flares, electrical and lighting, control instrumentation, instrument and utility air, inert gas and nitrogen, fire water and fire protection, hazard detection and spill containment, site security, and support buildings.

Vapor Handling System

During liquefaction, a small amount of the produced LNG is vaporized during let-down to storage pressure. The produced LNG would also displace some storage tank vapor. In addition, ambient heat input would cause a small amount of LNG to be vaporized. Some vaporization of LNG would be caused by other factors, such as barometric pressure changes, heat input due to pumping, and vessel flash vapor. The vapor handling system would recover these vapors for use in the facility fuel gas system that supplies the South Dunes Power Plant.

During LNG vessel loading operations, vapors are also released from the vessel cargo tanks due to simple displacement as the tanks are filled. This vapor would be returned to the LNG storage tanks. The BOG compressors would be located between the liquefaction trains, east of the LNG storage tanks.

Ground Flares

There would be two ground flares installed at the complex: one located within a 1-acre area north of the refrigerant storage area within the LNG terminal south of the Trans-Pacific Parkway (Area 7 on figure 2.1-2), and the other within the South Dunes Power Plant area west of the gas conditioning plant and north of geographic Jordan Cove. The flares would each be about 60 feet high and 55 feet wide at the base.

The ground flares would mostly be used on a temporary basis to burn off gas as a relief system during upset conditions, or under the following circumstances:

- initial cool down of the facility;
- extended power outages;
- extended emergency shut-down events; and
- unexpected loss of vapor handling equipment during LNG vessel loading with the LNG storage tanks operating near maximum normal pressure.

Instrument Air and Plant Air Systems

Plant air would be used through the facility to power tools and equipment used during plant operation and maintenance activities. Dry instrument air would be used for instrumentation and control systems. The plant instrument air packages would be located within the terminal process area, on the east side, between Liquefaction Trains #2 and #3.

Nitrogen

Liquid nitrogen would be trucked to the terminal from outside regional sources, and stored in a tank within the site. The pressure swing adsorption type nitrogen system would occupy an area 35 feet wide by 75 feet long or less than a tenth of an acre. Ambient air vaporizers would supply gaseous nitrogen for various uses in the terminal. The nitrogen would serve as the inert gas necessary for pre-commissioning and start-up, to test the tanks, and for drying out and cool down activities. Nitrogen would also be used to purge piping and equipment in preparation for operation, maintenance, and return to service.

Instrumentation and Process Control System

Overall plant process control and monitoring would be performed at consoles located in the various control rooms. The operator control level would consist of workstations, hardware pushbutton control stations, and peripherals. Operators would monitor liquefaction plant operations in the Liquefaction Control Room (Control Room #1). That control room would also be able to redundantly monitor operations at the South Dunes Power Plant. However, there would be separate South Dunes Site Control Room (Control Room #2), which could also redundantly monitor operations at the liquefaction terminal. The South Dunes Site Control Room would have the primary operator interfaces for the gas treatment plant. Controls for LNG vessel loading operations would be available at the LNG Berth Operator Building. The controls in the building would include the loading arm dedicated control system, ship-to-shore control system, and LNG vessel berthing system.

The terminal would be highly automated. The control systems consist of field instrumentation and a number of microprocessor based sub-systems. Operators would control and monitor the facility through a distributed control system (DCS). The DCS would be configured so that no single failure in a control room would result in a complete plant failure, or failure to inhibit a hazardous condition.

Electrical Systems

Electrical power for the LNG terminal would be provided from dedicated power generation provided by the South Dunes Power Plant. This power generation facility would be rated at approximately 420 MW and would be an independent power generation system exclusively for the terminal and associated facilities. A PacifiCorp connection would be provided by tapping the high voltage side of PacifiCorp's Jordan Point substation, which is currently located on the planned South Dunes Power Plant site but is planned to be relocated to a position adjacent to the Jordan Cove meter station. The PacifiCorp 115-kV feed would be transformed to 13.8-kV distribution to provide basic "house power" to the terminal and power generation sites. The South Dunes 230-kV substation would collect power from the site generators and distribute power to the Jordan Cove Project's 230-kV substation. Each 230-kV substation would have a 13.8-kV area distribution for lower utilization voltages and power distribution within the two process areas.

The total maximum operating load of the LNG terminal would be approximately 310 MW. This electrical load would be experienced during warm weather operations when LNG compression is required and LNG vessels are being loaded. Most of the facility's electrical load is comprised of motors, with the largest motors (the four liquefaction loop compressor drivers) rated at approximately 65,000 hp each.

Lighting System

Only lighting required for operation and maintenance, safety, security, and meeting FAA requirements would be used on the LNG storage tanks. The light would be localized to minimize offsite effects. The lighting levels would be based on American Petroleum Institute

(API) standards. Lighting around equipment and facilities where routine maintenance activities could occur on a 24-hour basis would range from 1 to 20 foot-candles, with 20 foot-candle lighting levels within the compressor enclosures. General process area lighting would be kept to a minimum, on the order of 2 foot-candles. LNG Terminal access/utility corridor lighting would be 0.4 foot-candle. Perimeter security would be on the order of 1.3 foot-candles, using evenly spaced 400 watt floodlights. As a point of reference, 20 foot-candles is close to the indoor lighting in a typical home, two foot-candles is typical of that found in a store parking lot, and 0.4 foot-candle is typical of residential street lighting. The lighting plan would use high pressure sodium (HPS) light fixtures during construction and final plant. The final lighting plan would be developed during detailed design.

Fuel Gas System

During normal operation, fuel gas would comprise compressed BOG siphoned off from an LNG vessel during loading, or the LNG storage tanks. After the BOG is compressed, a slip stream would be sent to fuel the incinerator, while the remaining would be combined with the Amine Flash Gas and sent to the South Dunes Power Plant to run its GTG turbines. In the event that the amount of BOG is insufficient for all terminal needs, it would be supplemented by dry fuel gas from the feed gas system. For plant commissioning and start up, fuel gas would be supplied from the local distribution company's existing (Northwest Natural) 12-inch-diameter natural gas pipeline on the North Spit, located adjacent to the Trans-Pacific Parkway. After the terminal is fully operational, the Northwest Natural interconnection would be used solely for facility space heating requirements.

Water Systems

After construction, about 34 acres at Jordan Cove's proposed LNG terminal would be covered by impervious surface materials, such as concrete and asphalt. Jordan Cove would design and construct a stormwater management system to gather runoff from impervious surfaces within the terminal, and direct the flow to designated areas for disposal. Stormwater drainage and collection would be accomplished by a system of ditches and swales. Stormwater collected in areas that have no potential for contamination would be allowed to flow or be pumped to ditches that ultimately drain to the slip. Stormwater collected in areas that are potentially contaminated with oil or grease would be pumped or would flow to the oily water collection sumps. Collected stormwater from these sumps would flow to the oily water separator packages before discharging to the industrial wastewater pipeline. No untreated stormwater would be allowed to enter federal or state waters.

Sanitary waste from the LNG loading berth building would be directed to a holding tank. A sanitary waste contractor would remove the contents of the tank as necessary and dispose of the contents at authorized disposal sites through the contractor's permits. Sanitary waste from the remainder of buildings would be directed to on-site septic systems.

The Coos Bay-North Bend Water Board (CBNBWB), which is the local water utility district, has an existing industrial wastewater pipeline that runs through the proposed Jordan Cove terminal tract. The line connects to an existing permitted ocean discharge. It was originally constructed to handle wastewater emitted from the now dismantled Weyerhaeuser mill, and at its peak it took in up to 3.5 million gallons per day (mg/d) of water. The only flow currently through the industrial wastewater line is about 500,000 gallons per day purchased by Weyerhaeuser from

CBNBWB that is passed through to keep the ocean diffusers operational. The industrial pipeline transports wastewater discharged from the two treatment basins at the former Weyerhaeuser linerboard mill site (future location of the South Dunes Power Plant). This treatment system has been approved for closure by the ODEQ, and the basins would be filled during construction of the South Dunes Power Plant. During construction of the Jordan Cove terminal, the CBNBWB industrial wastewater pipeline would be put out-of-service for about one week while it is relocated. The new industrial wastewater line would be routed along the Trans-Pacific Parkway to the South Dunes Power Plant, along an existing easement owned by the Port (see figure 2.1-10). A connection would be made between the new industrial wastewater line and the fire water pond at the proposed LNG terminal. Jordan Cove proposes to use the industrial wastewater line to discharge water used to hydrostatically test the LNG storage tanks during construction of the terminal. The Port has no other users of this line, therefore it should have sufficient capacity for the 1.8 mg/d flow from the release of Jordan Cove's hydrostatic test water.

The CBNBWB obtains water from groundwater wells on the North Spit, in addition to storing water at two reservoirs (Upper Pony Creek and Joe Ney). It has two raw water lines on the North Spit. One of the raw water lines begins at the well field north of the planned South Dunes Power Plant site (see figure 2.1-10), and was once the source of water for the Menasha-Weyerhaeuser mill. The second raw water line extends from a well field west of the proposed terminal and north of the Trans-Pacific Parkway to a water treatment plant. This 12-inch-diameter mainline adjacent to the highway has a normal static pressure of 40 psig. Jordan Cove proposed to install two taps on this line, one dedicated to replenish the fire water ponds, and the other to provide water for portable and utility requirements once the terminal is in operation.

Jordan Cove would pay for the design and construction of the tap meters and an 8-inch-diameter water pipeline extending about 4,900 feet from the Trans-Pacific Parkway to the terminal. After construction, the CBNBWB would own and operate that line. In addition, Jordan Cove proposed to install a tap and hydrant along the Trans-Pacific Highway mainline at the northwest corner of the terminal tract to supply water for the concrete batch plant, site grading activities, dust suppression, and other construction-related activities.

During construction of the terminal, Jordan Cove would use a total of approximately 1.7 billion gallons of water for various activities, including hydrostatic testing. During terminal operations, about 184 million gallons of water would be consumed annually. Water usage and impacts are more fully discussed in section 4.4 of this EIS.

At the liquefaction terminal, the fire water pond would be located within a roughly 4 acre area at the northwest corner of the tract, on the south side of the Trans-Pacific Highway (see figure 2.1-2). The pond would be divided into two parts: one for primary water supply, and the second as a backup. Each pond section could hold a minimum of 2,641,000 gallons, for a total capacity of at least 5,282,000 gallons. This would supply approximately 4 hours of fire-fighting water. The liquefaction terminal would include fire water loop mains encompassing the main process area, refrigerant area, LNG storage tanks, and LNG vessel berth.

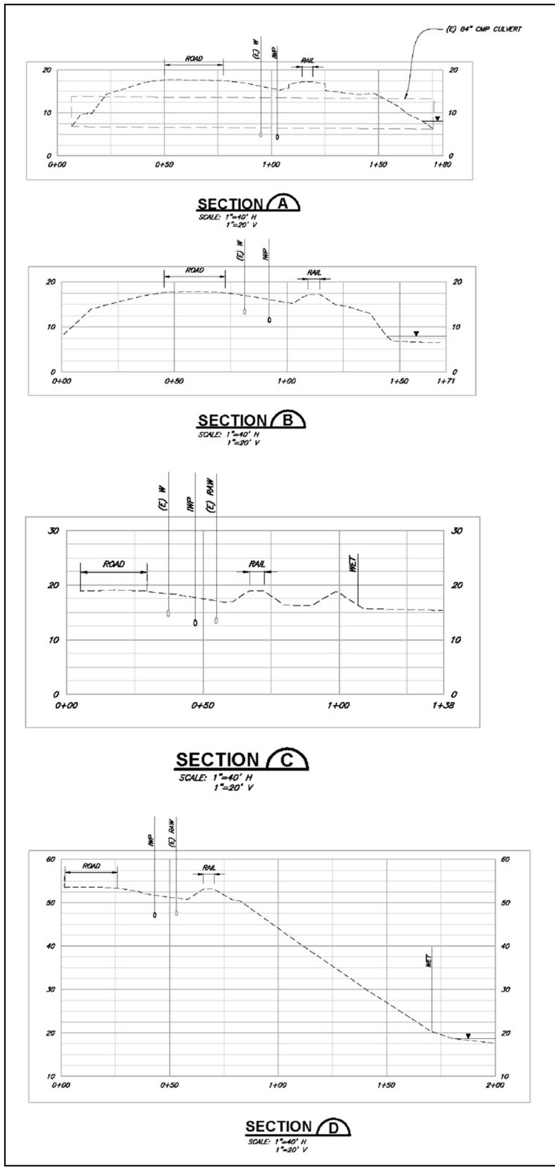


Figure 2.1-10

Industrial Wastewater Water Line Locations and Water Pipeline Locations

There are two existing one-million-gallon capacity water tanks on the dune on the west side of the Roseburg Forest Products tract. Both of these tanks are obsolete and would be decommissioned once the Jordan Cove LNG terminal is built. Roseburg Forest Products would then obtain its fire water from the new 12-inch-diameter CBNBWB raw water line extension that would be paid for by Jordan Cove, as mentioned above.

Support Buildings

Jordan Cove plans to construct a non-jurisdictional multi-organizational office complex (SORSC) to provide additional security, safety, and fire-fighting capabilities. That building would house a fire station, offices for the Coos County Sheriff, Coast Guard, and the Port, and a training center for the sheriff and Southwestern Oregon Community College. Jordan Cove has an agreement with the Coos County Sheriff that would allow the company to pay for on-site security personnel.

Table 2.1.1.10-1 lists the proposed support buildings for Jordan Cove's LNG terminal and the South Dunes Power Plant. The South Dunes administration building would be located at the northwest corner of the power plant. Continuing west from the South Dunes administration building along the south side of the power plant access road, there would be an operations building, guard building, and firewater pump house. The hazardous material storage building would be on the south side of the firewater pump building. The SORSC would occupy about 8 acres on the east side of Jordan Cove Road, south of the Trans-Pacific Parkway and north of the Roseburg Forest Products facility.

TABLE 2.1.1.10-1

Support Buildings at the Jordan Cove LNG Terminal and Power Plant Complex

Building	Location	Dimensions	Materials	Other Elements
South Dunes Administration Building	Northwest of the South Dunes Power Plant	Two-story, with 8,500 square feet per floor	Steel exterior frame, masonry or pre-case/pre-stressed wall panels	Building would include vestibule, offices, conference rooms, restrooms, shower-locker room, kitchen, first aid, file and storage area, and mechanical room
South Dunes Operations Building	West side of Administration Building , east of the South Dunes Guard Building, and north of the South Dunes Control Building	240 feet x 140 feet, two story design with varied eve heights	Pre-engineered structural steel metal roof and siding with sloped roof	Building would include a secured receiving area, warehouse inventory storage, additional storage area, offices, janitorial area and restroom facility in the Warehouse/Receiving. The Operations portions of the building side would contain the offices, conference rooms, men and women's locker facilities, mechanical/electrical rooms, cafeteria and food service, janitorial, and a plant first aid facility. The building would include all interior finishes, HVAC, lighting, building electrical, fire/smoke detection/protection, and plumbing.

TABLE 2.1.1.10-1

Support Buildings at the Jordan Cove LNG Terminal and Power Plant Complex

Building	Location	Dimensions	Materials	Other Elements
South Dunes Control Building	West of the South Dunes Power Plant and south of the Operations Building	104 feet x123 feet x 15 feet high	Reinforced masonry	Building would include control room, offices, conference room, storage, equipment room, break room, lab facility, and battery room
South Dunes Hazardous Material Storage Building	West of the Control Building and South of the Firewater Pump Building	33 feet square x 25 feet high	Pre-engineered structural steel structure, with metal roof and siding	Storage facility with air exchange handling units and sprinkler system to store hazardous materials such as paints, oil, and grease
South Dunes Guard Building	West of South Dunes Operations Building and east of the Firewater Pump Building	To be determined at final design	Pre-engineered structural steel structure, with metal roof and siding	Office for security personnel, storage room, and electrical cabinet
Southwest Oregon Resource Security Center	East side of Jordan Cove Road, south of the Trans-Pacific Parkway	To be determined at final design	To be determined at final design	Fire station, Sheriff office, Southwest Oregon Community College training space, Coast Guard office, and Port office
South Dunes Firewater Pump Shelter	West side of the South Dunes Guard Building	40 feet x 20 feet x 15 feet high	Pre-engineered structural steel structure, with metal siding and roof	Shelter would contain one diesel-driven firewater pump, one electrical firewater pump, and one electrical firewater jockey pump.
South Dunes Electrical Powerhouses (3 total)	Within the gas conditioning processing area	To be determined at final design	Manufactured steel self-enclosed structures	Powerhouses to include switch and control panels, and separate room for batteries
Liquefaction Terminal Maintenance/Warehouse Building	South side of utility corridor, west of terminal process area	150 feet x 170 feet x 30 feet high	Pre-engineered steel frame with metal siding and roof	Building would include storage, offices, conference room, equipment rooms, break room, rest rooms, shop, and crane
Liquefaction Terminal Guard Building	Northwest corner of the terminal tract, south side of Trans-Pacific Parkway, west of the terminal fire water ponds	24 feet x 36 feet x 12 feet high	Pre-engineered structural steel structure, with metal roof and siding	Building would include public access area, office, safety training room, storage room, and rest rooms
Liquefaction Terminal Main Electrical Substation Building	On east side of the Liquefaction Trains process area	95 feet x 170 feet x 30 feet high	Pre-fabricated metal building with metal roof	Building would include GIS Bus and breakers, control and relay panels, 125kV station service battery system
Liquefaction Firewater Pump Building	Northwest corner of the terminal tract, south of the fire water ponds	40 feet x 102 feet x 15 feet high	Pre-engineered steel frame structure with metal siding and roof	Shelter would contain four diesel driven firewater pumps, one electrical firewater pump, and one electrical firewater jockey pump
Tug Boat Operator and Crew Building	North of the tug boat dock, on the northwest corner of the marine slip	45 feet x 60 feet x 15 feet high	Pre-engineered structural steel building with metal siding and roof	Building would include operator area, MCC room, crew berth, and rest rooms
Liquefaction Terminal Compressor Shelters	Within the Liquefaction Trains process area, east of the LNG Storage Tanks	Four Refrigerant Shelters each 65 feet x 110 feet x 72 feet high; one BOG Shelter 80 feet x 135 feet x 72 feet high	Pre-engineered structural steel structures with metal roofing	The buildings provide shelter for refrigerant and BOG compressors, lube oil consoles, and maintenance cranes
Liquefaction Terminal Electrical Powerhouses	Five total, within the terminal liquefaction process area	To be determined at final design	Manufactured steel self-enclosed electrical powerhouses (5 total)	Powerhouses to include switch and control panels, and separate room for batteries

Along the south side of terminal utility corridor, west of Jordan Cove Road and east of the liquefaction process area, would be the terminal warehouse and maintenance building, and control building. The marine control building would be south of the transfer pipeline and LNG vessel berth, on the east side of the slip. The tug boat operations and crew building would be on the north side of the slip, north of the tug dock. The terminal guard building would be at the northwest corner of the property, on the south side of the Trans-Pacific Parkway.

2.1.1.11 Dredged and Excavated Material Disposal

Impacts associated with excavation and dredging activities during construction of Jordan Cove's LNG terminal, and maintenance dredging of the access channel and marine slip during terminal operations are more fully described in section 4.3.1 of this EIS.

Construction of the Marine Facilities

Construction of the access channel and slip for Jordan Cove's terminal would generate about 5.6 mcy of dredged and excavated material (see table 2.1.1.11-1). Of this, about 2.3 mcy would be dry excavated in the proposed slip area north of and behind the earthen berm that would remain in place to separate work in the upland from the bay during Phase 1 of the marine slip construction (see section 2.4.1.4 below). Also in the upland area north of the berth, during "Fresh Water" Phase 2 construction of the slip, up to about 1.5 mcy of material would be dredged in the pocket behind the berm. About 0.5 mcy of material would be dredged during removal of the berm, during the "Salt Water" Phase 3 construction of the slip. Lastly, about 1.3 mcy of material would be dredged from the bay during construction of the access channel between the current Coos Bay navigation channel and the proposed Jordan Cove terminal marine slip.

TABLE 2.1.1.11-1

Materials Excavated and Dredged During Construction of Terminal Marine Facilities

Area	Construction Phase	Activity	Volumes (mcy)
Slip	Upland - Phase 1	Land-based excavation	2.3
Slip	Fresh Water - Phase 2	Dredging in pocket behind berm	Up to 1.5
Slip	Salt Water – Phase 3	Dredging to remove berm	0.5
Access Channel	Salt Water – Phase 3	Dredging in bay	1.3
		Total:	**5.6**

Most of the 5.6 mcy of material excavated and dredged from the slip and access channel would be used to raise the elevation of the proposed terminal facilities above the tsunami inundation zone. A total of about 1.9 mcy would be placed on the LNG terminal upland process area. About 0.5 mcy of material from the removal of the berm between the northern portion of the slip and Coos Bay would be used for restoration of the dune on the east side of the slip area. The remaining materials (about 3.2 mcy) would be deposited at the former Weyerhaeuser linerboard site, which is the proposed location for the pipeline gas treatment facility and South Dunes Power Plant. The elevation of the base of the proposed LNG storage tanks would be raised to +30 feet, while the elevation of the process area at the terminal would be raised to about +46 feet. The elevation of the planned South Dunes Power Plant area would be raised to about +46 to +48 feet.

The excavated materials from the upland portion of the slip would be conveyed to the terminal process area and former linerboard mill site by trucks. The route for trucks hauling excavated materials from the slip to the planned South Dunes Power Plant area would be along the new Jordan Cove–owned road and utility corridor on the north side of the Roseburg Forest Products tract (see figure 2.1-9).

The materials dredged from the proposed terminal slip and access channel would be conveyed to the former Weyerhaeuser linerboard mill site through a slurry pipeline, approximately 8,650 feet long. This slurry pipeline would follow the shoreline of Coos Bay, through the Roseburg Forest Product tract (see figure 2.1-9). This would be a 20-inch-diameter polypropylene seamless pipeline placed directly on the ground; laying on top of the rip-rap along the shore of the Roseburg Forest Products tract. The return water from the planned South Dunes Power Plant would be carried back to the slip through a parallel decant pipeline laid adjacent to the slurry line. After the dredging of the slip and access channel is completed, these temporary slurry and decant pipelines would be dismantled and removed.

Operational Maintenance Dredging

Jordan Cove had Coast and Harbor Engineering (CHE) conduct a study of sedimentation over time in the access channel and slip and come up with estimates for the amount of material that would need to dredged in the future to maintain the depth of the access channel and slip (CHE 2011a). CHE estimated that the access channel would accumulate about 0.56 feet of sediment per year, equivalent to about 29,200 cubic yards (cy) of material, while the terminal slip would accumulate about 0.16 feet per year of sediment, equivalent to about 8,500 cy of material. Approximately a total of 37,700 cy of material could be dredged for maintenance of the access channel and slip combined in year one of operation of the terminal, and 34,600 cy in year 10. In the first 10 years of operation of the terminal, about 360,000 cy of material would need to be removed to maintain the proper depth of the access channel and slip, while in the next 10 years about 330,000 cy would need to be removed. CHE recommended that the access channel and slip should have maintenance dredging conducted about every 3 years with about 115,000 cy of material removed for the first 12 years of operation, and after that maintenance dredging could be done about every 5 years with up to 160,000 cy of materials removed.

Jordan Cove indicated that its preferred location for the disposal of maintenance dredging materials would in the Pacific Ocean at the existing Site F (see additional discussion of Site F below).

Site F

Site F is located in the Pacific Ocean, about 1.8 miles north-northwest of the north jetty at the mouth of Coos Bay (figure 2.1-11). The site is owned by the State of Oregon out to the 3-mile territorial limit, and the remainder by the COE. This is an existing EPA-approved offshore placement site, used by the COE since 1986 to disposal of materials dredged during maintenance of the Coos Bay navigation channel. The site was expanded in 1989, 1995, and 2006, so that it now encompasses about 3,075 acres, with water depths ranging from 20 to 160 feet. The COE has indicated that Site F has the capacity to take in the operational maintenance dredging of the LNG terminal access channel and slip, which over 20 years would be a total of about 690,000 cy of material.

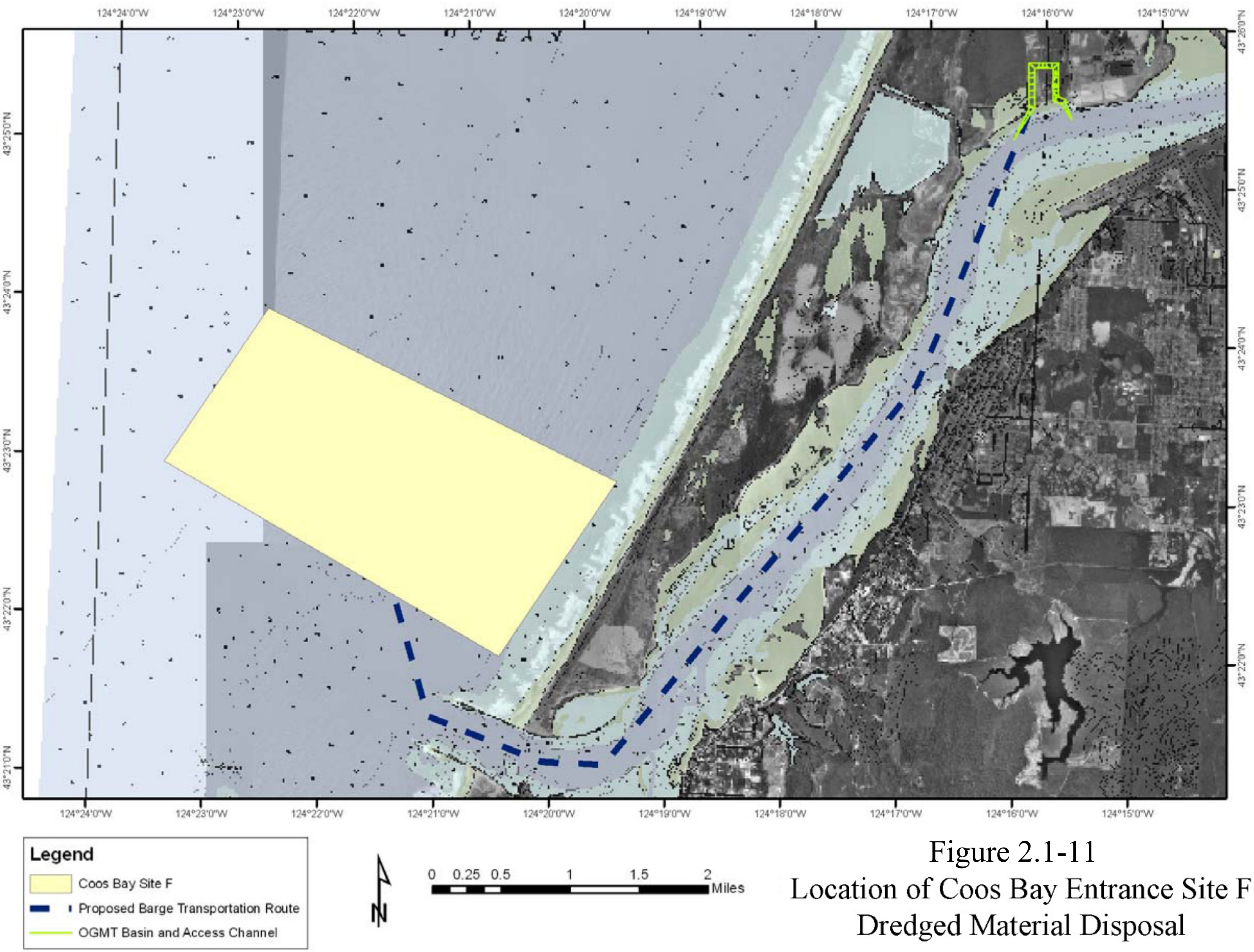


Figure 2.1-11
Location of Coos Bay Entrance Site F
Dredged Material Disposal

Jordan Cove estimated that during the first 10 years of operation of its LNG terminal it would have to conduct dredging to maintain the depth of the access channel and marine slip about every 3 years, taking out about 115,000 cy of material per event. This dredged material would be deposited at Site F. Jordan Cove had a consultant (Moffat & Nichol) prepare a *Slip and Access Channel Excavated & Dredged Material Management Plan* in 2013 that it submitted to the COE.[2]

Jordan Cove would have to obtain a permit from the COE for ocean disposal at Site F of operational maintenance dredged materials from the LNG terminal slip and access channel. As explained in section 1.5.1.4 of this EIS, in accordance with section 103 of the MPRSA, the COE would have to use EPA's criteria when making its decision whether to issue such a permit, and that decision would be subject to EPA's concurrence.

2.1.1.12 Wetland Preservation and Mitigation Areas

There are a number of wetlands identified adjacent and within the tract of land owned by Jordan Cove at the location of its proposed LNG terminal and the planned South Dunes Power Plant. In most cases, those wetlands would be avoided by construction activities, and preserved. The largest wetland adjacent to the terminal, on its west side, is Henderson Marsh. Jordan Cove would build a berm on the west side of its terminal property to isolate and protect Henderson Marsh. About 10.9 acres of Henderson Marsh within the property owned by Jordan Cove would be preserved (Area E3 on figure 2.1-2). No construction activities would take place in Henderson Marsh. There is a 27.6-acre wetland parcel on land owned by Jordan Cove on the north side of the proposed utility corridor, at the northeast corner of the terminal tract, which would also be avoided and preserved (Area E1 on figure 2.1-2). Lastly, on the east side of Jordan Cove Road, between the planned SORSC and the pipeline gas treatment plant, there is a 6.9-acre wetland on Jordan Cove property that would be avoided and preserved (Area E5 on figure 2.1-2).

Jordan Cove has proposed mitigating the loss of aquatic vegetation by funding an eelgrass restoration program in Coos Bay near the Southwest Oregon Regional Airport in North Bend, including establishing a minimum of 7.5 acres of eelgrass beds. In addition, on the north side of Coos Bay at Kentuck Slough, about 3 miles northeast of its LNG terminal tract, Jordan Cove proposed to use about 43.6 acres of the former Kentuck golf course which it has acquired as an estuarine wetland mitigation area. Also, as part of its freshwater wetland mitigation proposal, Jordan Cove would include about 2.9 acres of wetlands at the West Jordan Cove mitigation site and about 1.6 acres of wetlands and the West Bridge Site, both located on the east side of the Roseburg Forest Products property.[3] Additional information about wetland impacts and mitigation is presented in section 4.4.3.

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[2] A copy of the dredging plan was filed with the FERC as Appendix G.7 in Resource Report 7 included as part of Jordan Cove's May 2013 application.

[3] See *Jordan Cove Energy Project Compensatory Wetland Mitigation Plan* filed with the FERC in April 2014, revising their original filing from the May 2013 application.

2.1.1.13 Upland Preservation Areas

During construction and operation of its proposed LNG terminal, Jordan Cove would avoid and preserve about 6.5 acres of sand dunes within land owned by Jordan Cove at the north side of the terminal tract, south of the Trans-Pacific Parkway and north of the liquefaction process area (Area E2 on figure 2.1-2). A forested dune between the proposed marine slip and the Roseburg Forest Products property would be affected by removal of the Roseburg Forest Products water tanks, and construction of the barge dock and a temporary haul road between the dock and the planned South Dunes Power Plant (Area E-4 on figure 2.1-2). After terminal construction, about 15 acres of the LNG vessel berth dune would be restored. About 7 acres in the northwest corner of the terminal tract, on the south side of the Trans-Pacific Parkway would be used as a fill area, but Jordan Cove has not identified any facilities that would be placed in that location (Area 4F on figure 2.1-2). Existing upland habitats within the LNG terminal tract are discussed in section 4.5.1 of this EIS.

Landfill Cell #3, comprising debris from the demolition of the former Weyerhaeuser liner board mill, currently occupies about 6 acres northwest of the planned South Dunes Power Plant. Jordan Cove indicated it would relocate materials from this landfill, and fill in all but 2 acres. Land use for the Jordan Cove property is discussed in section 4.1.1. Potentially contaminated sediments and landfills at the former Menasha-Weyerhaeuser mill property is discussed in section 4.3.1.

2.1.1.14 Temporary Construction Use Areas

During construction of the South Dunes Power Plant, a number of temporary laydown areas would be utilized, over which permanent facilities would later be built. One construction laydown area of approximately 4 acres would be located west of the gas processing plant (Area 10 on figure 2.1-2). Another construction laydown area of 11 acres would be located south of the power plant, and later replaced by the stormwater pond during operation of the plant (Area 11 on figure 2.1-2). Table 2.3.1-1 in section 2.3 below details the land requirements for the Jordan Cove LNG terminal in acres affected during construction and operation.

Some of the temporary construction areas within the proposed LNG terminal tract process area would also later be replaced by permanent facilities. For example, construction trailers and the tank staging area would be located within the LNG storage tank area. The concrete batch plant would be where the terminal firewater pond would be located. The tank roof assembly area and process staging area used during construction would later be replaced by the liquefaction trains process area. At the north side of the LNG terminal tract, north of the liquefaction process area, Jordan Cove would use about 21 acres for a construction laydown area.

A temporary construction haul road would be built between the construction barge dock and the South Dunes Power Plant area, covering about 8 acres, through the Roseburg Forest Products property. Also, during construction of the terminal marine slip and access channel, a slurry pipeline and return water pipeline would be laid across the Roseburg Forest Products tract to the South Dunes Power Plant parcel, affecting about 1 acre. Jordan Cove would lease about 40 acres from Roseburg Forest Products for temporary construction areas, including offices, craft areas, warehouses and storage, fabrication, laydown, parking lots, and open areas. After construction, these areas would be restored to their previous condition and use.

In addition, Jordan Cove proposes to construct a temporary workers camp, the North Point Work Force Housing Project, on 48 acres north of the City of North Bend, on the south side of the McCullough Bridge. After the terminal is completed, that camp would be disassembled and removed, and the area restored to its previous condition and use.

2.1.2 Pacific Connector Pipeline and Associated Aboveground Facilities

Pacific Connector proposes to construct and operate a high-pressure underground welded steel natural gas pipeline, and associated aboveground facilities. All facilities would be designed, constructed, tested, operated, and maintained to conform with or exceed DOT requirements found in 49 CFR Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards*; the FERC requirements at 18 CFR 380.15, *Site and Maintenance Requirements*; and other applicable federal and state regulations. The location of the proposed pipeline project facilities are shown on detailed maps included in appendix C and described below.

2.1.2.1 Pipeline

Pacific Connector's proposed 36-inch-diameter natural gas pipeline would extend for about 232 miles between interconnections with GTN and Ruby pipelines near Malin and the Jordan Cove LNG terminal at Coos Bay. The pipeline would cross portions of Klamath, Jackson, Douglas, and Coos Counties, Oregon. For about 40 percent of its route (93 miles), the pipeline would be adjacent to existing powerlines, roads, and other pipelines with the remaining distance being newly created "green-field" right-of-way. Table D-1 in appendix D lists locations where the Pacific Connector pipeline would be adjacent to existing rights-of-way.

The pipeline would have a design capacity of 1.07 Bcf/d of natural gas, assuming a receipt pressure of about 900 psig at the supply interconnections near Malin, and a delivery pressure of 850 psig at the proposed Jordan Cove LNG terminal at Coos Bay. The maximum allowable operating pressure (MAOP) of the pipeline would be 1,480 psig.

The pipeline would be designed to flow natural gas from east to west, from its beginning point near Malin to the Jordan Cove LNG terminal. However, because the pipeline was originally planned and sited to support an LNG import terminal and flow gas west to east, milepost and station numbers are assigned from west to east. There are numerous years of data collected and review and resource analyses based on the original west to east mileposts. For the majority of this EIS, we describe the pipeline, and resources crossed by the pipeline in a west to east direction.

2.1.2.2 Aboveground Facilities

The new aboveground facilities proposed by Pacific Connector include 1 compressor station, 4 meter stations (2 co-located at one site), 5 pig launcher/receiver assemblies (all co-located with other aboveground facilities), 17 MLVs (3 co-located at proposed meter stations), and 11 communication towers (3 co-located at proposed meter stations) (table 2.1.2.2-1).

Jordan Cove Meter Station

Natural gas would be delivered to the proposed Jordan Cove LNG terminal via the newly proposed Jordan Cove Meter Station located at the western end of the Pacific Connector pipeline, at MP 1.5R, in Coos County. The meter station would be within Jordan Cove's property on the North Spit, adjacent to the planned South Dunes Power Plant, on the southeast side of geographic Jordan Cove on the northern shore of Coos Bay. The new meter station would occupy about 1 acre of industrial land, at the former location of the Weyerhaeuser linerboard mill. Access to the meter station would be from the existing Jordan Cove Road.

One building within the meter station would house the gas chromatographs, moister analyzer, communication equipment, and flow computer. Another building would house the control valves and ultrasonic meters. The station would include an MLV, a pig receiver, and a 140-foot-high communication tower. The station would be enclosed by a 7-foot-high chainlink fence, and the interior of the yard would be graveled.

TABLE 2.1.2.2-1

Pacific Connector's Proposed Aboveground Facilities

Facility	MP	Operational Acres a/	County	Ownership/ Jurisdiction
Jordan Cove Meter Station, MLV #1, Receiver, and Communication Tower	1.5R	0.9	Coos	Private
MLV #2 (Boone Creek Road)	15.7	0.1	Coos	Private
MLV #3 (Myrtle Point Stikum Road)	29.5	0.1	Coos	Private
MLV #4 (Deep Creek Spur)	48.4	0.1	Douglas	BLM
MLV #5 (South of Olalla Creek)	59.6	0.1	Douglas	Private
Clarks Branch Meter Station, MLV #6, Launcher/Receiver, and Communication Tower	71.5	1.0	Douglas	Private
MLV #7 (Pack Saddle Road)	80.0	0.1	Douglas	Private
MLV #8 (Highway 227)	94.7	0.1	Douglas	Private
MLV #9 (BLM Road 33-2-12)	112.1	0.1	Jackson	Forest Service b/
MLV #10 (Shady Cove)	122.2	0.1	Jackson	Private
MLV #11 and Launcher/Receiver (Butte Falls)	132.0	0.4	Jackson	Private
MLV #12 (Heppsie Mountain Quarry Spur)	150.7	0.1	Jackson	BLM
MLV #13 (Clover Creek Road)	169.5	0.1	Klamath	Private
MLV #14 and Launcher/Receiver	187.4	0.4	Klamath	Private
MLV #15 (Klamath River)	197.8	0.1	Klamath	Private
MLV #16 (Hill Road)	214.3	0.1	Klamath	Private
Klamath Compressor Station, Klamath-Beaver and Klamath-Eagle Meter Stations, MLV #17, Launcher, and Communications Tower	228.1	30.9	Klamath	Private
Blue Ridge Communication Tower	NA	0.2	Coos	BLM
Signal Tree Communication Tower	NA	0.2	Coos	BLM
Harness Mountain Communication Tower	NA	0.2	Douglas	Private
Winston Communication Tower	NA	0.2	Douglas	Private
Starveout Creek Communication Tower	NA	0.2	Jackson	Private
Flounce Rock Communication Tower	NA	0.2	Jackson	BLM
Robinson Butte Communication Tower	NA	0.2	Jackson	Forest Service
Stukel Mountain Communication Tower	NA	0.2	Klamath	BLM

a/ Values are rounded to the nearest tenth of an acre.
b/ Pacific Connector has agreed to move MLV #9 off of NFS land. Locations will be updated per FERC requirements in the FEIS.

Clarks Branch Meter Station

The newly proposed Clarks Branch Meter Station would be at MP 71.5 along the Pacific Connector pipeline, in Douglas County. At this location, Pacific Connector would interconnect to the existing Northwest Pipeline's Grants Pass Lateral. The meter station would cover about 1 acre of privately owned land that is currently used for agricultural purposes as cropland and pasture. The new meter station would be about 600 feet east of the western crossing of the South Umpqua River, with access from Dole Road (via permanent access road [PAR] 71.46).

One building would house a gas chromatograph, communications equipment, and flow computer. Another building would house the control valves and ultrasonic meters. Odorizing facilities, a MLV, and a pig/receiver would be located at the meter station. A 26-foot-high communication tower would also be installed. The station would be equipped with outside lighting; but the lights would only be utilized at night when people are working there. During normal operations, night-time work would not usually be scheduled. The station would be surrounded by a 7-foot-high chainlink fence, and the interior of the yard would be graveled.

Klamath-Beaver and Klamath-Eagle Meter Stations

Co-located within the boundaries of the 31-acre Klamath Compressor Station, in Klamath County, would be two newly proposed meter stations: the Klamath-Beaver Meter Station and the Klamath-Eagle Meter Station. The new Klamath-Beaver Meter Station would include an interconnection with the existing GTN pipeline system; while the new Klamath-Eagle Meter Station would serve as the interconnect with the existing Ruby pipeline system. GTN and Ruby would be the main sources of supply for the Pacific Connector pipeline.

Klamath Compressor Station

The newly proposed Klamath Compressor Station would be located approximately 1.8 miles northeast of the town of Malin, at the eastern beginning of the Pacific Connector pipeline, at MP 228.1. The new station site would accessible on the south from Malin Loop Road and on the west from Morelock Road. It would be adjacent to the existing GTN Malin/Tuscarora Meter Station and the Ruby Turquoise Flats facility. The Klamath Compressor Station would occupy a tract of about 31 acres that would also include the proposed Klamath-Eagle Meter Station and Klamath-Beaver Meter Station. The site is on private land that was used for agricultural purposes, as winter pasture. The parcel is relatively flat, and is covered by grasses and sage, with a few scattered juniper trees.

The nearest residence would be within 1,000 feet of the center of the site. Two other residences would be within 1,500 feet of the center of the site. The compressor station would be secured by a 7-foot-high chainlink fence. To minimize visual intrusions on nearby residences, the security fence would have screening slates, and landscaping would be installed along appropriate sides of the station.

Pacific Connector would install 41,000 ISO hp of new compression at the Klamath Falls Compressor Station. Pacific Connector would also install an additional 20,500 ISO hp standby compressor unit at the station. These would be turbine-driven, natural gas fired centrifugal compressor units. We analyze the possibility of using electric compressor units as an alternative in section 3.4.5.3 of this EIS.

The compression units would be installed in a new compressor building. Other facilities would include an inlet filter/separator, lube oil cooler, inlet air silencer/cleaner, and exhaust system. The compressor building would include skid-mounted fuel gas conditioning, measuring, and regulation equipment. Related suction and discharge headers and piping would be installed between the pipeline and the compressor units. Other buildings inside the station would include a control room/ancillary equipment building, unit valve skid buildings, and an office. The ancillary equipment building would include an air compressor system, hot water boiler, and back-up generator. The office building would include telephone and computer access. The station would also contain aboveground pig launcher equipment, a MLV, and a 26-foot-high communication tower.

Oil storage tanks at the facility would be constructed with appropriately sized secondary containment. Oil-filled operational equipment would be addressed in a manner consistent with the requirements of 40 CFR 112. All compressor station technicians would be trained for proper handling, storage, disposal, and spill response of hazardous fluids, and Pacific Connector would develop a *Spill Prevention, Containment, and Countermeasures Plan* (SPCCP).

The Klamath Compressor Station would be utilized as a maintenance base for operation of the pipeline facilities. The station would not be manned 24 hours per day, but would have emergency pipe, spare parts, portable equipment such as blow-down silencers, and small hand tools stored on site. The facility would be equipped with outside lighting to support night work activities; however, those lights would only be utilized when operations personnel are working after dark at the station, most likely to occur for short periods periodically during the winter.

Mainline Block Valves

Pacific Connector proposes to install 17 MLV along its pipeline route, spaced according to DOT requirements (CFR 192.179) (see table 2.1.2.2-1). Three of the MLVs would be co-located within proposed meter stations (at the Klamath Compressor Station, Clarks Branch Meter Station, and Jordan Cove Meter Station). MLVs would be equipped with actuators and control equipment as necessary to allow operations consistent with any applicable guidelines or rules promulgated by PHMSA for such facilities. Except for the MLVs located within meter stations, the compressor stations, and the two MLVs that also have pig launcher/receivers, each of the other MLVs would individually occupy a site 50 by 50 feet (less than one-tenth of an acre) and would be enclosed by a 7-foot-high chainlink fence. The two MLVs (#11 and #14) that include pig launchers and receivers would each individually occupy an area 95 feet by 200 feet, or less than half an acre. The MLVs would be within the construction and operational right-of-way for the Pacific Connector pipeline, except for the MLVs at meter stations, the compressor station, and that include pig launchers and receivers. Pacific Connector attempted to locate MLVs adjacent to existing roads to allow reliable all-weather access and minimize the length of new PARs. Pacific Connector would paint the aboveground piping in the MLV locations green, unless otherwise dictated by permit conditions.

Pig Launchers/Receivers

Pig launchers and receivers would allow Pacific Connector to maintain the interior of its pipeline using remotely operated pipe inspection and cleaning tools (known as "pigs"). A pig launcher would be within the proposed Klamath Compressor Station, and a pig receiver would be installed at the proposed Jordan Cove Meter Station. There would also be pig launcher and receivers at the proposed Clarks Branch Meter Station and MLVs #11 and #14. At these two MLVs, the pig launcher and receivers would occupy an area 95 feet by 200 feet, or less than half an acre. The pig launcher and receiver facilities would be located inside the fenced areas at all locations.

Gas Control Communications

The meter stations and compressor station would require a communications link with Williams Pacific Operator's gas control monitoring system in Salt Lake City, Utah. Therefore, new radio towers are proposed at each meter station and the compressor station. Pacific Connector has conducted initial communications studies and determined that in addition to the proposed towers at the meter stations and compressor station, leased space on existing communication towers would be needed for the Pacific Connector Pipeline Project. In addition to the communication facilities at the proposed meter stations and compressor station, Pacific Connector proposes to install communication facilities at eight existing towers (see table 2.1.2.2-2 and figure 2.1-12).

TABLE 2.1.2.2-2

Proposed and Existing Gas Control Communication Towers

Facility	County	Landowner	Tower Height	Operational Acres a/
Proposed New Towers				
Jordan Cove Meter Station b/	Coos	Private (Pacific Connector)	New tower 140-feet-high	<1 c/
Clarks Branch Meter Station	Douglas	Private (Pacific Connector)	New tower 26-feet-high	1
Klamath Compressor Station	Klamath	Private (Pacific Connector)	New tower 26-feet-high	31
Existing Communication Tower Sites				
Blue Ridge	Coos	BLM (Coos District)	Existing American Tower 161-feet-high	<1
Signal Tree	Coos	BLM (Coos District)	Existing American Tower 71-feet-high	<1
Winston	Douglas	Private	Existing tower 250-feet-high	<1
Harness Mountain	Douglas	Private (Northwest Pipeline)	Existing tower 150-feet-high	<1
Starvout Creek	Jackson	Private	Existing tower 60-feet-high	<1
Flounce Rock	Jackson	BLM (Medford District)	New tower 140-feet-high	<1
Robinson Butte	Jackson	Forest Service (Rogue River National Forest)	New tower 140-feet- high	<1
Stukel Mountain	Klamath	BLM (Lakeview District)	New tower 100-feet-high	<1

a/ Acreages are rounded to the nearest whole acre. If less than 1 acre, reported as "<1".
b/ A tower at this site would only be necessary if Pacific Connector is unable to mount an antenna on one of the structures within the LNG terminal site.
c/ The towers at meter or compressor stations would be within the operational easement of the stations.

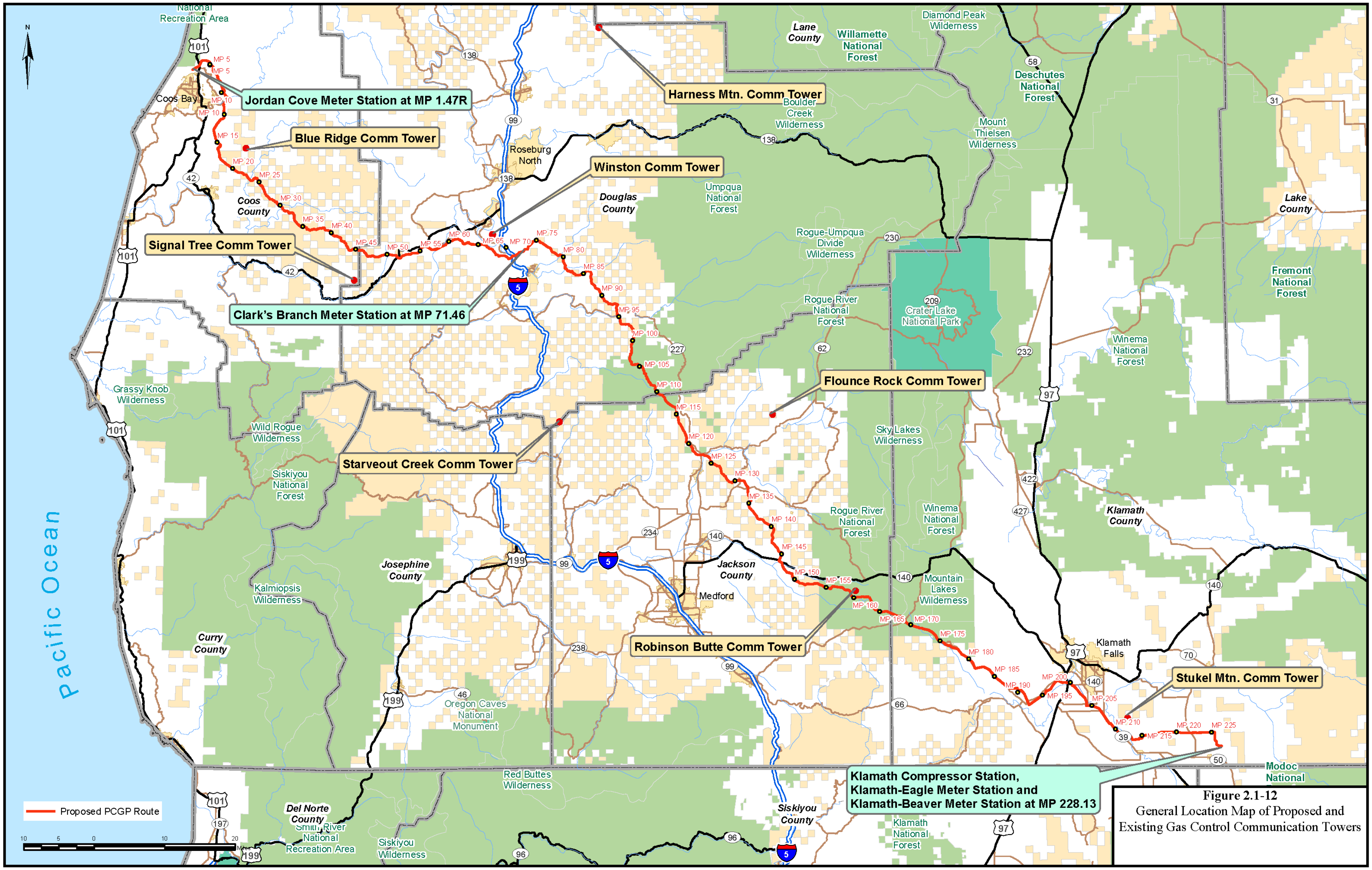


Figure 2.1-12
General Location Map of Proposed and Existing Gas Control Communication Towers

Pacific Connector prefers to co-locate with existing facilities when possible and would do so if leased space is available within existing facility sites at the time of construction. If leased space is not available on existing facilities and construction of new facilities is required, Pacific Connector would seek to obtain an approximately 100-foot by 100-foot (about one-quarter acre) area for each of the new facility installations in the immediate vicinity of the existing communication tower facilities. The new towers and communication buildings would be enclosed within a 50-foot by 50-foot (less than one-tenth an acre) fenced footprint located within the larger 100 foot by 100 foot area.

Of the eight existing communication towers, three are on privately owned land, and five are on federal lands. Williams, the managing partner of Pacific Connector, owns the tower at Harness Mountain, in Douglas County, which is currently used for Northwest Pipeline's existing Grants Pass Lateral.

For the five locations on federal lands, Pacific Connector prepared a *Communication Facilities Plan* (dated January 2013) as part of its POD.[4] There are three existing towers on BLM land at Blue Ridge, and Pacific Connector indicated that the tower operated by American Tower has space available and is suitable for co-location. At Signal Tree, on BLM land, there are 14 existing facilities. Pacific Connector indicated it may co-locate its new communication facilities at the existing tower of American Tower. There are eight existing communication facilities on BLM land at Flounce Rock. Pacific Connector is investigating co-location on the Telava tower. However, if Pacific Connector is unable to utilize the Telava tower, it would construct a new building and 140-foot-high tower at Flounce Rock. There are two existing towers on Forest Service land at Robinson Butte. However, neither tower is suitable for Pacific Connector, so it proposes to construct a new 140-foot-tower at this location. There are three existing communication facilities on BLM land at Stukel Mountain, but none are suitable for co-locating new Pacific Connector equipment. Therefore, Pacific Connector proposes to build a new 100-foot-high tower at this site.

2.1.3 BLM and Forest Service Land Management Plan Amendment Actions

Approximately 40 miles of the proposed Pacific Connector pipeline route would cross federal land administered by BLM Coos Bay, Roseburg, Medford Districts and the Klamath Falls Resource Area of the Lakeview District. Approximately 31 miles of the proposed Pacific Connector pipeline route would cross NFS lands administered by the Umpqua, Rogue River, and Winema National Forests. The Pacific Connector pipeline route would also cross less than one mile of Reclamation land and a number of easements and features related to the Klamath Project administered by the Mid-Pacific Region's Klamath Basin Area Office. BLM and NFS lands are managed according to current LMPs.

Similar to a county zoning ordinance, projects or activities that occur on BLM or NFS lands must be consistent with the respective LMP where the project or activity occurs. As proposed, the Pacific Connector Pipeline Project would not be consistent with certain elements of the affected BLM and Forest Service LMPs. Before the BLM can issue the Right-of-Way Grant, the

[4] This plan was filed as a stand-alone document with Pacific Connector's June 2013 application to the FERC, as Attachment 4 of the POD.

BLM and Forest Service must amend the affected LMP to make provision for the Pacific Connector pipeline. Table 2.1.3-1 describes the amendments to the respective LMPs that would be required to make provision for the Pacific Connector pipeline. With the exception of amendments to reallocate Matrix lands to LSR, the LMP amendments described in the table below are specific to the Pacific Connector Pipeline Project. The project-specific amendments would not change LMP requirements for other projects or authorize any other actions. With these amendments, the Pacific Connector Pipeline Project would be a conforming use of the affected BLM Districts and National Forests.

TABLE 2.1.3-1

BLM and Forest Service LMP Amendments Associated with the Pacific Connector Pipeline Project

Amendment #	Amendment	Description
BLM/FS-1	Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the BLM Coos Bay District, Roseburg District, Medford District, and Klamath Falls Resource Area of the Lakeview District RMPs, and the Umpqua National Forest, Rogue River National Forest, and Winema National Forest LRMPs	Applicable BLM district RMPs and national forest LRMPs would be amended to exempt certain known sites within the area of the proposed Pacific Connector Right-of-Way Grant from the Management Recommendations required by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (Forest Service and BLM 2001). For known sites within the proposed right-of-way that cannot be avoided, the 2001 Management Recommendations for protection of known sites of Survey and Manage species would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer only that portion of the buffer within the right-of-way would be exempt from the protection requirements of the Management Recommendations. Those Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way.
BLM-1	Site-Specific Exemption of Requirement to Protect Marbled Murrelet (MAMU) Habitat on the BLM Coos Bay District and Roseburg District.	The Coos Bay District RMP and Roseburg District RMP would be amended to waive the requirements to protect contiguous existing and recruitment habitat for MAMU within the Pacific Connector right-of-way that is within 0.5 mile of occupied MAMU sites, as mapped by the BLM. This would be a site-specific amendment applicable to the Pacific Connector pipeline right-of-way on the Coos Bay and Roseburg Districts, and would not affect or otherwise authorize any other project.
BLM-2	Site Specific Exemption of Requirement to Retain Habitat in Known Owl Activity Centers (KOAC) on the BLM Roseburg District	The Roseburg District RMP would be amended to exempt the Pacific Connector pipeline project from the requirement to retain habitat in KOAC at three locations. This would be a site-specific amendment applicable to the pipeline right-of-way, and would not affect or otherwise authorize any other project.
BLM-3	Reallocation of Matrix Lands to Late Successional Reserves (LSR) on the BLM Roseburg District	The Roseburg District RMP would be amended to change the designation of approximately 409 acres from the Matrix land allocations to the LSR land allocation in Sections 32 and 34, Township (T.) 29 ½ South (S.), Range (R.) 7 West (W.); and Section 1, T.30S., R.7W., Willamette Meridian (W.M.), Oregon. This change in land allocation is proposed to mitigate the potential adverse impact of the Pacific Connector pipeline project on LSRs in the Roseburg District. The amendment would change future management direction for the lands reallocated from matrix lands to LSR.
BLM-4	Reallocation of Matrix Lands to LSR on the BLM Coos Bay District	The Coos Bay District RMP would be amended to change the designation of approximately 387 acres from the Matrix land allocations to the LSR land allocation in Sections 19 and 29 of T.28S., R.10W., W.M., Oregon. This change in land allocation is proposed to mitigate the potential adverse impact of the Pacific Connector pipeline project on LSRs in the Coos Bay District. The amendment would change future management direction for the lands reallocated from matrix lands to LSR.
UNF-1	Site-Specific Amendment to Allow Removal of Effective Shade on Perennial Streams	The Umpqua National Forest LRMP would be amended to change the Standards and Guidelines for Fisheries (Umpqua National Forest LRMP, page IV-33, Forest-Wide) to allow the removal of effective shading vegetation where perennial streams are crossed by the Pacific Connector right-of-way. This change would potentially affect an estimated total of 3 acres of effective shading vegetation at approximately four perennial stream crossings in the East Fork of Cow Creek sub-watershed from pipeline MPs 109 to 110, in Sections 16 and 21, T.32S., R.2W., W.M., Oregon.

TABLE 2.1.3-1

BLM and Forest Service LMP Amendments Associated with the Pacific Connector Pipeline Project

Amendment #	Amendment	Description
UNF-2	Site-Specific Amendment to Allow Utility Corridors in Riparian Areas	The Umpqua National Forest LRMP would be amended to change prescriptions C2-II (LRMP IV-173) and C2-IV (LRMP IV-177) to allow the Pacific Connector pipeline route to run parallel to the East Fork of Cow Creek for approximately 0.1 mile between about pipeline MPs 109.7 and 109.8, in Section 21, T.32S., R.2W., W. M., Oregon. This change would potentially affect approximately 1 acre of riparian vegetation along the East Fork of Cow Creek.
UNF-3	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas	The Umpqua National Forest LRMP would be amended to waive limitations on the area affected by detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way. Standards and Guidelines for Soils (LRMP page IV-67) requires that not more than 20 percent of the project area have detrimental compaction, displacement, or puddling after completion of a project.
UNF-4	Reallocation of Matrix Lands to LSR	The Umpqua National Forest LRMP would be amended to change the designation of approximately 588 acres from the Matrix land allocation to the LSR land allocation in Sections 7, 18, and 19, T.32S., R.2W., W.M., Oregon; and Sections 13 and 24, T.32S., R.3W., W.M., Oregon. This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector Pipeline Project on LSR 223 on the Umpqua National Forest. This amendment would change future management direction for the lands reallocated from matrix to LSR.
RRNF-2	Site-Specific Amendment of Visual Quality Objectives (VQO) on the Big Elk Road	The Rogue River National Forest LRMP would be amended to change the VQO where the Pacific Connector pipeline route crosses the Big Elk Road at about pipeline MP 161.4 in Section 16, T.37S., R.4E., W.M., Oregon, from Foreground Retention (Management Strategy 6, LRMP page 4-72) to Foreground Partial Retention (Management Strategy 7, LRMP page 4-86) and allow 10-15 years for amended visual quality objectives to be attained. The existing Standards and Guidelines for VQO in Foreground Retention where the Pacific Connector pipeline route crosses the Big Elk Road require that VQOs be met within one year of completion of the project and that management activities not be visually evident.
RRNF-3	Site-Specific Amendment of VQO on the Pacific Crest Trail (PCT)	The Rogue River National Forest LRMP would be amended to change the VQO where the Pacific Connector pipeline route crosses the PCT at about MP 168 in Section 32, T.37S., R.5E., W.M., Oregon, from Foreground Partial Retention (Management Strategy 7, LRMP page 4-86) to Modification (USDA Forest Service Agricultural Handbook 478) and to allow 15-20 years for amended VQOs to be attained. The existing Standards and Guidelines for VQOs in Foreground Partial Retention in the area where the Pacific Connector pipeline route crosses the PCT require that visual mitigation measures meet the stated VQO within three years of the completion of the project and that management activities be visually subordinate to the landscape.
RRNF-4	Site-Specific Amendment of VQO Adjacent to Highway 140	The Rogue River National Forest LRMP would be amended to allow 10-15 years to meet the VQO of Middleground Partial Retention between Pacific Connector pipeline MPs 156.3 to 156.8 and 157.2 to 157.5 in Sections 11 and 12, T.37S., R.3E., W.M., Oregon. Standards and Guidelines for Middleground Partial Retention (Management Strategy 9, LRMP page 4-112) require that VQOs for a given location be achieved within three years of completion of the project. Approximately 0.8 miles or 9 acres of the Pacific Connector right-of-way in the Middleground Partial Retention VQO visible at distances of about 0.8 to 5 miles from State Highway 140 would be affected by this amendment.
RRNF-5	Site-Specific Amendment to Allow Utility Transmission Corridors in Management Strategy 26, Restricted Riparian Areas	The Rogue River National Forest LRMP would be amended to allow the Pacific Connector right-of-way to cross the Restricted Riparian land allocation. This would potentially affect approximately 2.5 acres of the Restricted Riparian Management Strategy at one perennial stream crossing on the South Fork of Little Butte Creek at about pipeline MP 162.45 in Section 15, T.37S., R.4E., W.M., Oregon. Standards and Guidelines for the Restricted Riparian land allocation prescribe locating transmission corridors outside of this land allocation (Management Strategy 26, LRMP page 4-308).

TABLE 2.1.3-1

BLM and Forest Service LMP Amendments Associated with the Pacific Connector Pipeline Project

Amendment #	Amendment	Description
RRNF-6	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas	The Rogue River National Forest LRMP would be amended to waive limitations on areas affected by detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way in all affected Management Strategies. Standards and Guidelines for detrimental soil impacts in affected Management Strategies require that no more than 10 percent of an activity area should be compacted, puddled, or displaced upon completion of project (not including permanent roads or landings). No more than 20 percent of the area should be displaced or compacted under circumstances resulting from previous management practices including roads and landings. Permanent recreation facilities or other permanent facilities are exempt (RRNF LRMP 4-41, 4-83, 4-97, 4-123, 4-177, 4-307).
RRNF-7	Reallocation of Matrix Lands to LSR	The Rogue River National Forest LRMP would be amended to change the designation of approximately 512 acres from the Matrix land allocation to the LSR land allocation in Section 32, T.36S., R.4E. W.M., Oregon. This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector pipeline project on LSR 227 on the Rogue River National Forest. This amendment would change future management direction for the lands reallocated from Matrix to LSR.
WNF-1	Site-Specific Amendment to Allow Utility Corridors in Management Area 3	The Winema National Forest LRMP would be amended to change the Standards and Guidelines for Management Area 3 (MA-3) (LRMP page 4-103-4, Lands) to allow the Pacific Connector pipeline corridor in MA-3 from the Forest Boundary in Section 32, T.37S., R.5E., W.M., Oregon, to the Clover Creek Road corridor in Section 4, T.38S, R.5. E., W.M., Oregon. Standards and Guidelines for MA-3 state that the area is currently an avoidance area for new utility corridors. This proposed new utility corridor is approximately 1.5 miles long and occupies approximately 17 acres.
WNF-2	Site-Specific Amendment of VQO on the Dead Indian Memorial Highway	The Winema National Forest LRMP would be amended to allow 10-15 years to achieve the VQO of Foreground Retention where the Pacific Connector right-of-way crosses the Dead Indian Memorial Highway at approximately pipeline MP 168.8 in Section 33, T.37S., R.5E., W. M., Oregon. Standards and Guidelines for Scenic Management, Foreground Retention (LRMP 4-103, MA 3A, Foreground Retention) requires VQOs for a given location be achieved within one year of completion of the project. The Forest Service proposes to allow 10-15 years to meet the specified VQO at this location.
WMF-3	Site-Specific Amendment of VQO Adjacent to the Clover Creek Road	The Winema National Forest LRMP would be amended to allow 10-15 years to meet the VQO for Scenic Management, Foreground Partial Retention, where the Pacific Connector right-of-way is adjacent to the Clover Creek Road from approximately pipeline MPs 170 to 175 in Sections 2, 3, 4, 11, and 12, T.38S., R.5E., W.M., Oregon, and Sections 7 and 18, T.38S., R.6E., W.M., Oregon. This change would potentially affect approximately 50 acres. Standards and Guidelines for Foreground Partial Retention (LRMP, page 4-107, MA 3B) require that VQOs be met within 3 years of completion of a project.
WNF-4	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas	The Winema National Forest LRMP would be amended to waive restrictions on detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way in all affected management areas. Standards and Guidelines for detrimental soil impacts in all affected management areas require that no more than 20 percent of the activity area be detrimentally compacted, puddled, or displaced upon completion of a project (LRMP page 4-73, 12-5).
WNF-5	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in Management Area 8 (Riparian Area MA-8)	The Winema National Forest LRMP would be amended to waive restrictions on detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way within the Management Area 8, Riparian Area (MA-8). This change would potentially affect approximately 0.5 mile or an estimated 9.6 acres of MA-8. Standards and Guidelines for Soil and Water, MA-8 require that not more than 10 percent of the total riparian zone in an activity area be in a detrimental soil condition upon the completion of a project (LRMP page 4-137, 2).

2.1.3.1 Proposed Amendments of the BLM Coos Bay District RMP

The BLM proposes to amend the Coos Bay RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species on the BLM Coos Bay District

Current Resource Management Plan: Management direction for S&M species in the Coos Bay RMP (page 33) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,* require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Coos Bay District RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species, as amended, in the Coos Bay District RMP by adding by the following text to page 33:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Coos Bay District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Coos Bay District of BLM and would not affect or otherwise authorize any other project.*

BLM-1: Site-Specific Exemption of Requirement to Protect MAMU Habitat on the BLM Coos Bay District

Current Resource Management Plan: The Coos Bay District RMP requires protection of contiguous existing and recruitment habitat for MAMU that is within 0.5 mile of occupied MAMU sites, as mapped by the BLM (page 36).

Proposed Amendment: This proposal would amend the Coos Bay District RMP management direction for MAMU (page 36) by adding the following text to page 36:

> *The requirement to protect contiguous existing and recruitment habitat for marbled murrelets that is within the Pacific Connector right-of-way is waived for the Pacific Connector Gas Pipeline Project. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas*

Pipeline on the Coos Bay District of BLM and would not affect or otherwise authorize any other project.

BLM-4: Reallocation of Matrix Lands to LSRs on the Coos Bay District

Current Resource Management Plan: Standards and Guidelines for Developments in LSRs on the Coos Bay District require that new developments that may adversely affect LSRs be minimized or mitigated (page 20). This change in land allocation is proposed to mitigate the potential adverse impact of the Pacific Connector pipeline on LSRs on the Coos Bay District.

Proposed Amendment: The proposal would amend the Coos Bay RMP as follows**:**

The Coos Bay District RMP and District Strategy Map (Map 3) are amended to change the designation of approximately 387 acres from the Matrix land allocations to the LSR land allocation in Sections 19 and 29 of T. 28 S., R. 10 W., W. M., Oregon. The amendment would change future management direction for the lands reallocated from matrix lands to LSR.

2.1.3.2 Proposed Amendments of the BLM Roseburg District RMP

The BLM proposes to amend the Roseburg District RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species on the BLM Roseburg District

Current Resource Management Plan: Management direction for S&M species in the Roseburg District RMP (page 23) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,* require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Roseburg District RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species in the Roseburg District RMP by adding by the following text to page 23:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Roseburg District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment *applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Roseburg District of BLM and would not affect or otherwise authorize any other project.*

BLM-1: Site-Specific Exemption of Requirement to Protect MAMU Habitat on the BLM Roseburg District

Current Forest Plan: The Roseburg District RMP requires protection of contiguous existing and recruitment habitat for MAMU that is within 0.5 mile of occupied MAMU sites, as mapped by the BLM (page 48).

Proposed Amendment: This proposal would amend the Roseburg District RMP management direction for MAMU (page 48) by adding the following:

This requirement to protect marbled murrelet habitat is waived for the Pacific Connector Gas Pipeline. This would be a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Roseburg District of BLM and would not affect or otherwise authorize any other project.

BLM-2: Site Specific Exemption of Requirement to Retain Habitat in KOAC on the BLM Roseburg District

Current Resource Management Plan: The Roseburg District RMP requires retention of habitat in KOAC (page 48).

Proposed Amendment: This proposal would waive management direction in the Roseburg District RMP to protect habitat in KOAC for the NSO (page 48) by adding the following text:

This requirement to retain habitat in Known Owl Activity Centers is waived for the Pacific Connector Gas Pipeline. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Pipeline on the Roseburg District of BLM and would not affect or otherwise authorize any other project.

BLM-3: Reallocation of Matrix Lands to LSR on the BLM Roseburg District

Current Resource Management Plan: Standards and Guidelines for Developments in LSRs on the Roseburg District require that new developments that may adversely affect LSRs be minimized or mitigated (page 30). This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector pipeline on LSRs on the Roseburg District.

Proposed Amendment: The proposal would amend the Roseburg RMP as follows**:**

The Roseburg District RMP District Strategy Map is amended to change the designation of approximately 409 acres from the Matrix land allocations to the LSR land allocation in Sections 32 and 34, Township (T.) 29 South (S.), Range (R.) 7 West (W.); and Section 1, T. 30 S., R. 7 W., Willamette Meridian (W.M.), Oregon. The amendment would change future management direction for the lands reallocated from Matrix lands to LSR.

2.1.3.3 Proposed Amendments of the BLM Medford District RMP

The BLM proposes to amend the Medford District RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the BLM Medford District

Current Resource Management Plan: Management direction for S&M species (page 25) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Medford District RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species in the Medford District RMP by adding by the following text to page 25:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Medford District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Medford District of BLM and would not affect or otherwise authorize any other project.*

2.1.3.4 Proposed Amendment of the BLM Klamath Falls Resource Area RMP

The BLM proposes to amend the Klamath Falls Resource Area of the Lakeview District RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Klamath Falls Resource Area RMP

Current Resource Management Plan: Management direction for S&M species (page 11) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Klamath Falls Resource Area RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species in the Klamath Falls Resource Area RMP by adding the following text to page 12:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Coos Bay District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline and would not affect or otherwise authorize any other project.*

2.1.3.5 Proposed Amendments of the Umpqua National Forest LRMP

The Forest Service proposes to amend the Umpqua National Forest LRMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Umpqua National Forest LRMP

Current Land and Resource Management Plan: Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, amended the Umpqua National Forest LRMP to require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Umpqua National Forest LRMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species by adding the following text to the Umpqua National Forest LRMP, page IV-3, Standards and Guidelines:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Umpqua National Forest. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These*

Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the Forest Service from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Umpqua National Forest and would not affect or otherwise authorize any other project.

UNF-1: Site-Specific Amendment To Allow Removal of Effective Shade on Perennial Streams

Current Land and Resource Management Plan: The Pacific Connector pipeline would cross four perennial streams on the Umpqua National Forest. Forest wide Standards and Guidelines for Fisheries prohibit removal of effective shading vegetation on perennial streams (LRMP, page IV-33 S&G #1). Forest-wide Standards and Guidelines for Water Quality require retention of shade unless a site-specific assessment shows that shade removal would not result in an increase in water temperature (LRMP, page IV-60, S&G #1).

Proposed Amendment: The proposed amendment would change Forest Wide Standards and Guidelines for Fisheries, S&G #1 on page IV-33 and Standards and Guidelines for Water Quality, S&G #1 on page IV-60 by adding the following text:

Removal of effective shade is permitted where the Pacific Connector Gas Pipeline corridor crosses perennial streams. This amendment applies only to the corridor of the Pacific Connector Gas Pipeline where it crosses perennial streams on the Umpqua National Forest. It does not affect any other project, or establish future management direction.

UNF-2: Site-Specific Amendment To Allow Utility Corridors in Riparian Areas

Current Land and Resource Management Plan: Facilities prescriptions C2-II on page IV-173 and C2-IV on page IV-177 restrict utility corridors from running parallel to Class II streams.

Proposed Amendment: This amendment would add the following language to Facilities prescriptions C2-II on page IV-173 and C2-IV on page IV-177 by adding the following text:

The Pacific Connector Gas Pipeline corridor would parallel a Class II stream in the East Fork of Cow Creek for approximately 0.1 miles. This amendment applies only to the project area of the Pacific Connector Gas Pipeline and does not change future management direction.

UNF-3: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas

Current Land and Resource Management Plan: Forest Wide Standards and Guidelines for Soils (Umpqua NF LRMP, page IV-67, S&G #1) requires that not more than 20 percent of the project area should have detrimental compaction, displacement or puddling after completion of the project.

Proposed Amendment: This amendment would change Soils Forest Wide Standards and Guideline #1 on Page IV-67 by adding the following text:

> *The Pacific Connector Gas Pipeline may exceed the restriction on detrimental soil conditions. This amendment applies only to the right-of-way and associated work areas of the Pacific Connector Gas Pipeline. It does not affect other projects, or change any future management direction.*

UNF-4: Reallocation of Matrix Lands to LSRs on the Umpqua National Forest

Current Land and Resource Management Plan: Standards and Guidelines for Developments in LSRs require that new developments that may adversely affect LSRs be minimized or mitigated (see *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl*, Page C-17). This change in land allocation is proposed to partially mitigate the potential adverse impact of the PCGP on LSR 223 on the Umpqua National Forest.

Proposed Amendment: The proposal would amend the Umpqua Forest LRMP as follows**:**

> *The Umpqua National Forest LRMP is amended to change the designation of approximately 588 acres from Matrix land allocations to the LSR land allocation in Sections 7, 18, and 19, T.32S., R.2W., and Sections 13 and 24, T.32S., R.3W., W.M., OR.*

2.1.3.6 Proposed Amendments of the Rogue River National Forest LRMP

The Forest Service proposes to amend the Rogue River National Forest LRMP as follows[5]:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Rogue River National Forest LRMP

Current Land and Resource Management Plan: Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, amended the Rogue River National Forest LRMP to require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Rogue River National Forest LRMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species by adding the following text to the Rogue River National Forest LRMP on page 4-31 – Standards and Guidelines:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized*

[5] RRNF-1 to establish a goal for energy transmission related to the Pacific Connector pipeline was included in the NOI for this project. The Forest Supervisor of the Rogue River National Forest has determined this amendment was not necessary.

under a right-of-way for the Pacific Connector Gas Pipeline on the Rogue River National Forest. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the Forest Service from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Rogue River National Forest and would not affect or otherwise authorize any other project.

RRNF-2: Site-Specific Amendment of VQO on the Big Elk Road

Current Land and Resource Management Plan: The location where the Pacific Connector pipeline intersects the Big Elk Road is in Management Strategy 6, where the VQO is Foreground Retention. This VQO must be met within one year of completion of the Pacific Connector Pipeline Project and management activities must not be visually evident (Rogue River National Forest LRMP, Page 4-72).

Proposed Amendment: This amendment proposes to change the VQO for Management Strategy 6 on page 4-72 of the Rogue River National Forest LRMP (Description) and to allow additional time to meet the VQO, as follows:

In the vicinity where the Pacific Connector Gas Pipeline right-of-way crosses the Big Elk Road, the Visual Quality Objective is amended from Foreground Retention to Foreground Partial Retention and 10 to 15 years will be allowed for the amended Visual Quality Objectives to be attained. This amendment applies only to the right-of-way of the Pacific Connector Gas Pipeline in the vicinity of the Big Elk Road and does not change future management direction for any other project.

RRNF-3: Site-Specific Amendment of VQO on the PCT

Current Land and Resource Management Plan: The location where the Pacific Connector pipeline crosses the PCT is in Management Strategy 7, where the VQO is Foreground Partial Retention. VQOs must be met within three years of completion of an activity, and the management activity should be visually subordinate to the landscape.

Proposed Amendment: This amendment proposes to change the VQO for Management Strategy 7 on page 4-86 of the Rogue River National Forest LRMP (Description) to read as follows:

In the vicinity where the Pacific Connector Gas Pipeline right-of-way crosses the Pacific Crest Trail (PCT) the VQO is amended from Foreground Partial Retention to Modification and up to twenty years will be allowed for VQOs to be attained. This amendment applies only to the right-of-way of the Pacific Connector Gas Pipeline in the vicinity of the Pacific Crest Trail and does not change future management direction.

RRNF-4: Site-Specific Amendment of VQO Adjacent to Highway 140

Current Land and Resource Management Plan: The ridgetop where the Pacific Connector pipeline runs adjacent to Highway 140 is in Management Strategy 9, where the VQO is Middleground Partial Retention. Management activities may be evident but visually subordinate to the natural landscape and VQOs must be met within three years of completion of an activity.

Proposed Amendment: This amendment proposes to change the VQO for Management Strategy 9 on page 4-112 of the Rogue River National Forest LRMP (Description) to read as follows:

> *In the vicinity where the Pacific Connector Gas Pipeline right-of-way runs along Highway 140, 10 to 15 years will be allowed for VQOs to be attained. This amendment applies only to the right-of-way of the Pacific Connector Gas Pipeline in the vicinity of Highway 140 and does not change future management direction.*

RRNF-5: Site-Specific Amendment to Allow Utility Transmission Corridors in Management Strategy 26, Restricted Riparian Areas

Current Land and Resource Management Plan: Restricted Riparian, Management Strategy 26, extends at least 100 feet or to the extent of the riparian vegetation on each side of perennial streams. The Pacific Connector pipeline route crosses Management Strategy 26 lands at the South Fork of Little Butte Creek. Standards and Guidelines for the Restricted Riparian Management Strategy (Rogue River National Forest LRMP, page 4-308) states that transmission corridors should be located outside of this management strategy.

Proposed Amendment: This amendment proposes to change Standards and Guidelines for MA 26 on page 4-308 by adding the following text:

> *The Pacific Connector Gas Pipeline corridor is allowed to cross the Restricted Riparian land allocation at the South Fork of Little Butte Creek. This amendment applies only to the right-of-way and associated work areas of the Pacific Connector Gas Pipeline where they cross the Restricted Riparian land allocation. It does not affect any other project or establish future management direction.*

RRNF-6: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions Within the Pacific Connector Right-of-Way in All Management Areas

Current Land and Resource Management Plan: Standards and Guidelines for soils in all Management Areas require that no more than 10 percent of the activity area be detrimentally compacted, puddled or displaced upon completion of a project or activity.

Proposed Amendment: This amendment proposes allow the Pacific Connector Pipeline Project to exceed restrictions on detrimental soil conditions. The following language would amend existing LRMP direction for soils in all Management Areas:

> *Standards and Guidelines for detrimental soil conditions may be exceeded in all management areas crossed by the Pacific Connector Gas Pipeline. This amendment applies only to the right-of-way and associated work areas of the Pacific Connector Gas Pipeline. It does not affect other projects, or change any future management direction.*

RRNF-7: Reallocation of Matrix Lands to LSR

Current Land and Resource Management Plan: Standards and Guidelines for Developments in LSRs require that new developments that may adversely affect LSRs be minimized or mitigated (see *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl*, Page C-17). This change in land allocation is proposed to partially mitigate the potential adverse impact of the PCGP on LSR 227 on the Rogue River National Forest.

Proposed Amendment: The proposal would amend the Rogue River National Forest LRMP as follows**:**

> *The Rogue River National Forest LRMP is amended to change the designation of approximately 512 acres from Matrix land allocations to the LSR land allocation in Section 32, T.36S., R.4E. W.M., OR.*

2.1.3.7 Proposed Amendments of the Winema National Forest LRMP

The Forest Service proposes to amend the Winema National Forest LMRP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Winema National Forest LRMP

Current Land and Resource Management Plan: Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, amended the Winema National Forest LRMP to require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Winema National Forest LRMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species by adding the following text to the Winema National Forest LRMP on page 4-38, Forestwide Standards and Guidelines:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Winema National Forest. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the Forest Service from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the*

Pacific Connector Gas Pipeline on the Winema National Forest and would not affect or otherwise authorize any other project.

WNF-1: Site-Specific Amendment To Allow Utility Corridors in Management Area (MA) 3

Current Land and Resource Management Plan: The Pacific Connector pipeline route crosses MA 3 – Scenic Management between the Forest Boundary with the Rogue River and the Clover Creek Road. Standards and Guidelines for Lands in MA 3 on page LRMP pages 4-103 and 4-104, Lands state that MA 3 is an avoidance area for new utility corridors.

Proposed Amendment: This amendment would add the following text to MA 3 under Lands on pages 4-103 and 4-104:

The Pacific Connector Gas Pipeline may create a corridor in MA 3 from the Forest Boundary to the Clover Creek Road. This amendment applies only to the project area of the Pacific Connector Gas Pipeline and does not change future management direction.

WNF-2: Site-Specific Amendment of VQO on the Dead Indian Memorial Highway

Current Land and Resource Management Plan: At the location where the Pacific Connector pipeline route crosses the Dead Indian Memorial Highway the VQO is Foreground Retention. Standards and Guidelines for Scenic Management, Foreground Retention (Management Area 3A, LRMP page 4-104) require VQO for a given location to be achieved within one year of completion of the Pacific Connector Pipeline Project.

Proposed Amendment: The Forest Service proposes to allow a longer time frame to meet the specified VQO where the Pacific Connector pipeline route crosses the Dead Indian Memorial Highway. The following language would be added under MA 3A Standards and Guideline Scenic 1 Page 4-104, item 2:

In the vicinity of the 75 foot wide Pacific Connector Gas Pipeline corridor crossing of the Dead Indian Memorial Highway, 10 to 15 years will be allowed for VQOs to be attained. This amendment applies only to the project area of the Pacific Connector Gas Pipeline and does not change any future management direction.

WNF-3: Site-Specific Amendment of VQO Adjacent to the Clover Creek Road:

Current Land and Resource Management Plan: Where the Pacific Connector pipeline is adjacent to the Clover Creek Road, the VQO is Foreground Partial Retention. Standards and Guidelines for Scenic Management, Foreground Partial Retention (Management Area 3B, Scenic Standard & Guideline 1, page 4-107) requires that visual quality objectives be met within three years of completion of the Pacific Connector pipeline.

Proposed Amendment: The Forest Service proposes to allow a longer time frame to meet the amended VQO where the Pacific Connector pipeline is adjacent to the Clover Creek Road. The following text would be added under MA 3B Standard and Guideline Scenic 1 Page 4-107, item 2:

In the vicinity where the Pacific Connector Gas Pipeline corridor runs adjacent to Clover Creek Road, ten to fifteen years will be allowed for VQOs to be attained. This *amendment applies only to the project area of the Pacific Connector Gas Pipeline in the vicinity of the Clover Creek Road and does not change future management direction.*

WNF-4: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas

Current Land and Resource Management Plan: Standards and Guidelines for Detrimental Soil Conditions (LRMP, page 4-73, 12-5) in all affected management areas require that no more than 20 percent of the activity area be detrimentally compacted, puddled, or displaced upon completion of a project.

Proposed Amendment: This amendment would change Standard and Guideline 12-5 on page 4-73 by adding:

The Pacific Connector Gas Pipeline may exceed this restriction on detrimental soil conditions. This amendment applies only to construction clearing limits and work/storage areas within the project area of the Pacific Connector Gas Pipeline and does not change any future management direction.

WNF-5: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in Management Area (MA) 8

Current Land and Resource Management Plan: Standards and Guidelines for Soil and Water 2 in MA 8 Riparian Area (LRMP, page 4-137) requires that detrimental soil condition not exceed 10 percent of the total riparian acreage within an activity area.

Proposed Amendment: This amendment would change Soil and Water Standard and Guideline 2 on page 4-137 by adding:

The Pacific Connector Gas Pipeline may exceed this restriction on detrimental soil conditions within the project right of way. This amendment applies only to the construction clearing limits of the Pacific Connector Gas Pipeline and does not change future management direction.

2.1.4 Mitigation Plan Specific to Federal Lands

Mitigation measures reduce or compensate for environmental consequences of an action. All relevant, reasonable mitigation measures are to be identified, even if they are outside of the jurisdiction of the lead agencies or cooperating agencies (CEQ 1981: 12-13). An extensive off-site mitigation program on BLM and NFS lands is included in the Proposed Action to ensure that the objectives of the affected land management plans are achieved. Appendix F of this EIS provides an assessment of off-site mitigation actions on BLM and NFS lands. Table 2.1.4-1 summarizes the mitigation program by project types for both agencies. The table lists the individual mitigation projects that are incorporated into the BLM and Forest Service Proposed Action. Many of the projects listed in table 2.1.4-1 lack the site-specific surveys needed for implementation and, as a result, are not ripe for decision at this time. These mitigation projects are therefore being analyzed programmatically as a part of the Proposed Action in this EIS. It is anticipated that many of these projects would require a secondary site-specific project-level NEPA analysis prior to implementation. Those secondary site-specific project-level NEPA analyses would tier to this EIS as provided in the CEQ NEPA regulations at 40 CFR 1502.20 and 1508.28(b).

This mitigation program is implemented through separate Agreements in Principle between Pacific Connector and the BLM and Forest Service, respectively. The Agreements in Principle between Pacific Connector and BLM and Forest Service would provide a framework to implement the respective mitigation projects and reasonable assurance that they would be completed. CEQ regulations require that a monitoring and enforcement program be adopted where applicable for any mitigation (40 CFR 1505.2(c)). Section 2.6 describes the monitoring and enforcement requirements associated with this mitigation program. A comprehensive monitoring plan for the mitigation program is included in appendix F.

Mitigation Groups That Address LMP Amendments on BLM and NFS Lands

We received comments requesting that commercial logging, which would generate income, or replanting, law enforcement, and other projects that would be funded without this project, not be used as mitigation. In addition, a comment letter received after the end of the formal scoping period about the Pacific Connector Gas Pipeline expressed a concern that commercial logging has been proposed as mitigation for take of NSOs and MAMUs, and that between 7,560 and 9,649 acres would be commercially logged. The commenter also expressed a concern about whether receipts from commercial timber sales would be used to reduce Pacific Connector's expenses, requested clarification of the NEPA pathway for these projects, and questioned the applicability of fuels reductions in native, mature, or old-growth forests. We are addressing that comment here to clarify possible misunderstandings.

Commercial logging is not being used as mitigation for take of NSOs and MAMUs. Commercial logging is one tool that may be used to remove commercial-sized material to accomplish fuels reduction objectives that are used as mitigation for project impacts to LSOG forests. Table 2.1.4-1 summarizes the Mitigation Groups and Project Types designed to meet the objectives of BLM and Forest Service LMPs. The reason for each activity, as well as the benefit of the mitigation, is included in the table.

NSO are dependent on LSOG forests. Monitoring of the NWFP for the past 15 years has shown that the largest single factor contributing to the loss of LSOG forests (and hence NSO habitat) has been high-intensity stand replacement fire (Moeur et al. 2011). The NWFP anticipated the need to reduce fuels to reduce the risk of stand replacement fire in LSOG forests, particularly in the Klamath Province (Forest Service and BLM 1994b: C-12). The Recovery Plan for the NSO also recognized the need for fuels reduction in dry forest habitats of the Klamath Province (FWS 2011a: III-20). Late Successional Reserve Assessments for LSR 223 and 261 have also documented the need for fuels reduction to reduce the risk of stand replacement fire in LSOG forests in the Klamath Province of southwest Oregon (Forest Service et al. 1998; BLM and Forest Service 1998).

The Pacific Connector Project would remove approximately 188 acres[6] of LSOG forest on BLM and Forest Service lands in the Klamath and Western Cascade Provinces. Additional acres

[6] GNN data set clipped to the Pacific Connector Right of Way in the Klamath and Western Oregon Cascades Provinces.

would be indirectly affected by edge effects and fragmentation. As a partial mitigation for this impact, the BLM and Forest Service propose to accomplish approximately 6,600 acres (table 2.1.4-1) of integrated fuels reduction in overstocked stands along the Pacific Connector corridor on ridge top locations between the community of Milo on the South Umpqua River and the community of Trail on the Rogue River. The primary purpose of these fuels reduction projects is not to have commercial timber sales; it is to reduce the risk of stand-replacement fire and possible losses of LSOG forest / NSO habitat in an area that has a history of lightning fires. No estimate has been made of the total acres of fuels reduction projects that may involve commercial timber removal. No fuels reduction or thinning projects are currently proposed in MAMU habitat or in the vicinity of the KOAC at MP 86 although these habitats could possibly benefit from this activity.

The proposed fuels reduction mitigation measure would be a combination of thinning mostly smaller trees from below, ladder fuels reduction, and hand piling and burning smaller material. Portions of this fuelbreak would also be underburned. A portion of this area may involve commercial timber sales where removal of commercial-sized material is necessary to accomplish project objectives. Otherwise, commercial-sized material would need to be piled and burned, which would unnecessarily contribute to greenhouse gases and waste wood that could otherwise be utilized in local sawmills and biomass facilities. Stand structure upon completion within the fuelbreak areas would be a more fire-resilient variable density, multi-layer stand (to the degree stand conditions allow) with down wood and an appropriate snag component. Average stand diameter would increase because mostly smaller trees would be removed. All stand treatments would be consistent with land management plans of the administrative unit where the projects occur, the Standards and Guidelines for designated areas and matrix lands under the NWFP (Forest Service and BLM 1994b: C-12) and the recommendations associated with LSR and Watershed Assessments. Recommendations of the current Recovery Plan for NSO would be considered. It is also anticipated that thinning of slow-growing overstocked stands would accelerate growth rates and development of larger trees that are more characteristic of NSO habitat. This activity is specifically provided for the NWFP (Forest Service and BLM 1994b: B-7, C-12).

The commenter expressed a concern that receipts from commercial timber sales were somehow being used to offset Pacific Connector’s expenses for mitigation, and that the projects proposed should not otherwise be funded by agency budgets. Receipts from commercial timber sales would not be used to offset Pacific Connector’s expenses for these projects, nor are these projects paid for from agency budgets. Pacific Connector is providing the funding for work the BLM and Forest Service could not otherwise accomplish. Pacific Connector would provide the funds to do site-specific project planning, and to pay for the on-site non-commercial service contract work such as cutting and hand piling non-commercial ladder fuels, burning piles, and underburning. It is intended that work be accomplished as efficiently as possible whether by service contracts, commercial timber sales, or a combination of both. There is no intent to require Pacific Connector to pay for work that could otherwise be accomplished more efficiently by commercial timber sale contracts. Any timber sale receipts from these projects would be subject to the normal contract payment provisions and timber sale receipt regulations of the BLM and Forest Service.

The comment expressed a concern that the Pacific Connector EIS would not provide sufficient information to allow informed public comment or to support a final project decision on the proposed mitigation projects. NEPA compliance for these projects will require subsequent, site-specific analyses and, where applicable, consultation with appropriate regulatory agencies. In this EIS, these mitigation measures are described programmatically as part of the Proposed Action. This EIS may not provide the final, site-specific, project-level NEPA documentation that would allow these projects to proceed. The CEQ regulations for NEPA specifically provide for the second phase of a project, such as mitigation, to tier to the EIS of a larger specific action when those subsequent actions are ripe for decision (40 CFR 1508.28). It is anticipated that the NEPA analysis for the proposed mitigation actions would tier to this EIS as site-specific assessments and final project designs are completed. The public would have opportunity to comment on specific project proposals at that time.

The comment also questioned whether commercial timber sales should be used in mature, native, late-successional, or old-growth forests as a method to reduce fuels. While there are many opinions related to management of native, mature, late-successional, or old-growth forests (and the commenter expressed their opposition to the use of commercial timber sales as a means to reduce fuel loading), the LMPs of the Roseburg District BLM, Medford District BLM, and Umpqua National Forest as amended by the NWFP make provision for thinning and silvicultural treatments to reduce fuel loading and accelerate the development of late successional stand characteristics (Forest Service and BLM 1994b: B-7, C-12). Subsequent site-specific project planning and analysis would need to demonstrate whether the proposed projects are consistent with the respective LMPs where the proposed projects would occur, and whether they were consistent with the objectives of the proposed mitigation actions in this EIS.

Table 2.1.4-1 summarizes the Mitigation Groups and Project Types to meet the objectives of BLM and Forest Service LMPs. The reason for each activity, as well as the benefit of the mitigation, is included in the table. Mitigation proposed for BLM and NFS lands is separate from programmed timber management, post-harvest reforestation, or ongoing administration activities.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Aquatic and Riparian Habitat			The Pacific Connector Pipeline Project would remove riparian vegetation and cross streams. Aquatic restorations are aimed accomplishing objectives of the Aquatic Conservation Strategy (ACS) and offsetting project impacts at the watershed scale. Proposed mitigation projects are located in the fifth-field watersheds that would be crossed by the pipeline; however, feasible projects may not be located in the same sub-watersheds as the pipeline project.	
	Large Woody Debris (LWD) In-stream	29.8 Miles	Placement of LWD in streams adds structural complexity to aquatic systems by creating pools and riffles, trapping fine sediments and can contribute to reductions in stream temperatures over time (Tippery et al. 2010). This is responsive to ACS objectives 2, 3, 4, and 5.	**Short-term adverse effects**: Large woody debris in-stream refers to logs (typically greater than 20 inches in diameter), limbs, or root wads that intrude into a stream channel. Placing this material in-stream can be accomplished with ground equipment such as excavators and/or helicopters. These activities have the potential to increase suspended sediment in streams and impact riparian vegetation as a result of heavy equipment use or the dragging of materials (e.g. logs) in the stream channel. Short-term impacts to water quality would occur in the form of suspended sediment and turbidity increases during in-stream implementation. However, no lasting measureable effect to water quality would occur as any sediment plume created, would quickly dissipate as soon as in-stream activities stop. In-stream work is done during summer low flow periods when turbidity plumes are an infrequently occurring event. Project design features (PDF) would include Best Management Practices (BMP) that would prevent any indirect effects to salmonids and other stream fish from project related sediment. The placement of restoration materials in the stream by using cable systems, excavators, or helicopters would create noise that could disturb both NSO and MAMU. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects**: Placing structure in streams affects channel morphology, the routing and storage of water and sediment, and provides structure and complexity to stream systems. Complex pools and side channels created by instream wood provide overwintering habitat to stream salmonids and other aquatic organisms (Solazzi 2000). They also provide cover from predators during summer low flow periods when predation is at its highest. Providing more stream channel structure results in better over wintering habitat, improved summer pool habitat, and more abundant spawning gravels.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Fish Passage	14 Projects	Old culverts may block fish passage either by poor design or by failure over time. Removing these blockages and replacing them with fish-friendly designs can allow fish and other aquatic organisms to access previously unavailable habitat. This is responsive to ACS Objectives 1, 2, 3, and 9 (see appendix J).	**Short-term adverse effects:** Removing old culverts and restoring stream/road crossings would result in short-term adverse effects similar to the effects described for Large Woody Debris above since both involve the use of heavy equipment in and around the stream channel. Similarly the work would be done during low summer flow periods to minimize impacts to aquatic species and PDFs would be designed to minimize disturbance for NSO and MAMU.
	Stream / Road Crossings	58 Sites	Restoring stream crossings reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal at pipeline crossings. This work is typically accomplished in association with road improvement and decommissioning efforts.	**Long-term beneficial effects:** Stream crossing replacement would directly improve stream connectivity and habitat for aquatic species by immediately restoring access to formerly inaccessible habitats. Indirectly, these projects would reduce potential sediment levels in the long term by decreasing the potential for road failure. Stream crossing projects also reduce stream velocities by increasing stream crossing sizes, eliminating flow restrictions and allowing passage to additional reaches of habitat by removing barriers to aquatic species which improves access to spawning and rearing habitat and allows unrestricted movement throughout stream reaches during seasonal changes in water levels (Hoffman 2007).
	Riparian Planting	0.5 Miles	Riparian planting reestablishes willows and other riparian vegetation in areas where prior land use has removed existing vegetation. Riparian plantings reestablish shade, increase bank stability and, over time, contribute to restored riparian plan plant communities.	**Short-term adverse effects:** Riparian planting and fencing are typically done by hand and as such would not measurably impact stream sedimentation of erosion, riparian vegetation, water quality, aquatic habitats or any T&E species. Riparian fencing may require vegetation removal along the fence line but would not adversely affect water quality, channel substrate or bank conditions.
	Fencing	6.4 Miles	Fencing restricts cattle grazing in sensitive riparian ecosystems. This allows riparian vegetation to be reestablished and eliminates hoof damage to stream banks.	**Long-term beneficial effects:** These projects directly affect riparian vegetation and would increase the health of riparian areas by promoting species diversity. Planting riparian vegetation decreases areas of bare soil and provides a sediment filtering buffer. A diverse native riparian plant community consisting of annuals, perennials, woody shrubs, and trees, provides a large variety of habitat features including food sources, shade, and large wood, and rooting depths which provide stream bank stability. Diverse, healthy vegetation has a major influence on stream channel shape and size; well-vegetated streams tend to be narrow and deep due to the binding nature of plants and their root systems (Comfort 2005). Excluding livestock access from the stream channel and riparian area would improve ecological conditions within the riparian areas. Livestock tend to congregate in riparian areas due to the presence of water and green vegetation and cooler temperatures throughout the drier months. Livestock trample and graze riparian vegetation, resulting in stream bank erosion and loss of biological diversity (Belsky 1999). Excluding livestock from the riparian area would allow vegetation to reestablish and increase the likelihood of success of native shrub and tree plantings (Sarr 2002).

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Road Sediment Reduction			The pipeline project may cause sediment transport from construction clearing and use of roads by the project. Road sediment reduction projects are aimed at reducing the chronic contributions of fine-grained sediment from road surfaces and fill failures to stream systems.	
	Road Decommissioning b/	98.5 Miles	Decommissioning roads can substantially reduce sediment delivery to streams (Madej 2000; Keppeler et al. 2007). Proposed road decommissioning would increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the Project occur. This mitigation is responsive to ACS objectives 2, 3, 4, and 5 and Standards and Guidelines for Key Watersheds (Forest Service and BLM 1994b: p. B-11, C-7).	**Short-term adverse effects:** Road decommissioning methods generally include actions utilizing mechanized construction equipment to physically stabilize the road prism, restore natural drainage patterns, and allow for revegetation of the roadbed. Mechanized construction equipment might include excavators, backhoes and truck mounted loaders. Road closure is a method of preventing access to a road so that regular maintenance is no longer needed and future erosion is largely prevented by restoring drainage patterns if necessary and eliminating road traffic. Road decommissioning has the potential to cause short-term degradation of water quality by increasing sediment delivery to streams as roads are de-compacted by heavy equipment, culverts and cross drains are removed, and other restoration activities are implemented. The use of heavy mechanized equipment near streams could disturb the stream influence zone, deliver sediment, create turbidity, and cause stream bank erosion. There is also the potential of an accidental fuel/oil spill. These projects may cause a short-term degradation of water quality due to sediment input and chemical contamination. Stream bank condition and habitat substrate may also be adversely affected in the short term. However with careful project design and seasonal timing, these affects are expected to be of a limited extent and duration. Road decommissioning would create noise from heavy equipment that could disturb both NSO and MAMU. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels.
	Road Closure	18.0 Miles	Road closure reduces fine grained sediments by eliminating traffic impacts.	

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
				Long-term beneficial effects: Proposed road decommissioning would increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the Project would occur. Decommissioning roads would restore natural drainage patterns and thereby avoid large volumes of added sediment to the stream network that would be likely to eventually occur. In addition limited road maintenance dollars could be focused on the remaining road systems resulting in more maintenance of culverts and ditchlines resulting in less potential for catastrophic failure. Madej (2001) concluded that by eliminating the risk of stream diversions and culvert failures, road removal treatments significantly reduce long-term sediment production from retired logging roads. Beneficial effects to fisheries include long-term improvements to fish habitat and riparian areas, restored fish passage for all life histories of threatened and proposed species, re-established connectivity of fish populations above and below man-made barriers, restoration of hydrologic function, more natural routing of wood and sediment through stream systems. Road decommissioning would also benefit many species of wildlife including the NSO and MAMU thru reduced disturbance from the elimination of road traffic and long-term benefits as decommissioned roads become reforested reducing fragmentation of habitat.
	Road Surfacing and Drainage Improvement	80.6 Miles	Road surfacing reduces sediment by capping existing fine textured sediments in the running surface of a gravel road with coarser rock or by paving. Paving all but eliminates traffic-generated sediments. Drainage repair reestablishes out-sloping, cross-drains and in some cases ditchlines to ditch-relief culverts. These actions have the effect of getting water off the road before it can enter stream courses. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (Forest Service and BLM 1994b: p. B-11, C-7).	**Short-term adverse effects:** Road improvements including surfacing, drainage repair, storm proofing, stabilization, and culvert replacement may result in short-term, construction-related increases in sediment. Sediment is expected to be of limited extent and duration and can be minimized or eliminated through the application of PDFs and BMPs. Road improvements would create noise from heavy equipment that could disturb both NSO and MAMU. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels.
	Storm-proofing	13.8 Miles	Storm-proofing reduces sediment from roads by increasing the resistance of a road to failure during high intensity rainfall events. Storm-proofing strategies include improving drainage, reducing diversion potential at culverts, outsloping road surfaces, and replacing culverts with hardened low water fords.	**Long-term beneficial effects:** Road improvement projects reduce erosion from existing road surfaces, cut banks and fill slopes, and reduce the probability of failure through improvement of road surface stability and drainage. In the long term, road improvements reduce both chronic and episodic erosion and sedimentation. Drainage improvements, such as out-sloping, reduce or eliminate chronic sources of road erosion and fine sediment delivery resulting in long-term improvements in water

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Stabilization and Culvert Replacement	5 sites	Road stabilization and culvert replacement reduce road-related sediment by stabilizing or removing failing cut and fill slopes. Culvert replacement reduces sediment by replacing undersized or failing culverts with culverts that are appropriate to pass debris at higher flows. This reduces the probability of fill failure associated with plugged culverts.	quality and aquatic habitat.
Fire Suppression	Suppression Capacity	26 Sites	The pipeline project would create fire suppression complexity by creation of a continuous corridor of early seral plant communities. High intensity stand-replacement fire has been identified as the single largest factor causing the loss of LSOG forests in the first 15 years of implementation of the Northwest Forest Plan (NWFP; Moeur et al. 2011). These projects include heli-ponds (3) and pumper access / dry hydrant pumper connections at water sources. High intensity fire has been identified as the single factor most impacting LSOG forest habitats on federal lands in the area of the NWFP. Fire control is necessary to protect LSRs and endangered species habitat should a wildfire occur. Construction of the pipeline and associated activities would remove both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Quick response time is imperative for successful control in wildfire situations during initial attack. Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts.	**Short-term adverse effects:** Fire suppression capacity projects include the use of heavy equipment especially for the construction of heli-ponds which may be as large as 500,000 gallons. Soil erosion risk would increase with the proposed activities because bare soil would be exposed during implementation. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. By employing appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. Fire suppression capacity projects would create noise from heavy equipment that could disturb both NSO and MAMU. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts. These projects would help to reduce the threat of losing late-successional habitat to stand-replacement fire.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	**Project Type**	**Amount**	**Rationale**	**Environmental Consequences a/**
Stand Density and Fuels Reduction and Fuel Break			The pipeline project would create fire suppression complexity by creation of a continuous corridor of early seral plant communities. The pipeline project would also remove LSOG stands in the corridor construction areas and indirectly affect LSOG habitat in stands adjacent to the pipeline. Both mature stands and developing stands would be removed during pipeline construction. Density management integrated with fuels reduction would increase longevity of existing mature stands by reducing losses from disease, insects, and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions would reduce risk of loss to fire and reduce potential fire size and intensity. Impacts to mature and developing stands would exceed the life of this project by many decades. LSR Assessments have identified the importance of density management to control losses to stand replacing fire. The proposed route of the pipeline project intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. These mitigation projects would assist in protection and restoration of the late-seral forest values. These mitigation projects would provide multiple resources values for the LSR, Forest, adjacent private landowners, and public.	

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Integrated Stand Density and Fuels Reduction	6,563 Acres	Watershed assessments and LSR assessments in Southwest Oregon have noted shifts from forests dominated by fire-resistant LSOG stands to fire-prone early and mid-seral forests (Forest Service, BLM et al. 1998; Forest Service and BLM 1998, 1999). Use of fuels reduction and stand density management are appropriate tools to reduce the risk of high intensity stand replacement fires in these forests (Forest Service and BLM 1994b). Management activities that reduce the risk of natural disturbance adjacent to KOAC are also appropriate (Forest Service and BLM 1994b: p. C-11). Stand density reductions in riparian zones have the dual benefit of reducing the risk of stand-replacing fire, while also accelerating the development of late successional stand conditions by accelerating growth of remaining trees. This project would create a fuel break on federal lands that stretches from Milo to Shady Cove.	**Short-term adverse effects:** Integrated stand density and fuels reduction activities include the use of heavy equipment for cutting, skidding, slash piling, under-burning and hauling forest vegetation. Soil erosion risk would increase with the proposed activities because bare soil would be exposed during implementation. As the amount of bare/compacted soil increases, so does the risk of soil movement. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. By maintaining proper amounts of protective groundcover along with appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. Stand density fuels reduction treatments would not be expected to adversely affect nesting habitat for the NSO since the treatments would not remove constituent elements of their nesting habitat. The proposed harvest treatments could temporarily impact acres of dispersal habitat. This habitat would be impacted by reduction of canopy cover as well as the loss of some down wood, shrubs and snags, which provide habitat for prey species. Although the dispersal habitat within these treatment areas would be reduced in quality, the projects would be designed so that the areas would still function as dispersal habitat. Integrated stand density treatments would create noise from heavy equipment that could disturb the NSO. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. Under-burning and burning of slash piles can impact air and visual quality during burning activities. All burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan and to minimize any adverse effects on air quality. Burning prescriptions would be developed to minimize the potential for adverse effects. Implementation of these measures would ensure compliance with the Clean Air Act. **Long-term beneficial effects:** By creating less dense stands with less tree competition, residual trees would benefit from the increased availability of sunlight, nutrients, and water. With the increase of available nutrients, trees should be more vigorous and less susceptible to large scale insect/disease outbreaks. The proposed treatments would move the vegetation towards conditions that would have occurred under a natural disturbance regime. This would lower flame lengths, reduce fire spread and lower the probability of tree mortality in the event of a wildfire, leading to more successful suppression efforts. Aerial delivered retardant or water would be more effective in lighter fuels and a more open canopy, making it safer for firefighters to successfully anchor and contain wildfires. These actions would reduce the threat of losing late-successional habitat to fire.
	Under-burning	2,035 Acres	Under-burning is a component of the integrated stand density reduction. This provides a mechanism to maintain shaded fuel breaks created by mechanically thinning stands. It also reintroduces fire on selected landscapes as recommended in various watershed and LSR assessments.	
	Pre-commercial Thinning	1,039 Acres	Pre-commercial thinning reduces stand density in overstocked young stands. This reduces the risk of stand replacing fire, increases the resilience of remaining trees to low intensity fire and accelerates the development of late successional stand characteristics.	
	Riparian Vegetation Fuels Reduction	70 Acres/ 6 Miles	Fuels reduction in riparian areas reduces the risk of stand replacement fire and accelerates the development of late successional stand characteristics.	

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Terrestrial / Upland Habitat Improvement			The Pacific Connector Pipeline Project would remove snags and LSOG upland habitats, and would create a vector for noxious weeds. Terrestrial mitigations are intended to offset the loss of snags, future recruitment of LWD and eradicate noxious weed populations.	
	Habitat Planting	620 Acres	The Dead Indian Plateau region is one of four known sites for Mardon Skipper butterflies in the world: southern Oregon Cascades, northern California/Southern Oregon coast, southern Washington Cascades, and Puget Trough on Joint Base Lewis-McChord. It is also adjacent to a known site for Short-horned Grasshoppers. Both species are on the Regional Forester's Sensitive Species list. As a permanent opening, the pipeline corridor would provide a unique opportunity to develop habitat for these two species. Planting the corridor with plants preferred by these species has the potential to increase the habitat and local range for both species. This action would provide both short-term and long-term habitat for the local population of Mardon skipper butterflies and short-horned grasshoppers since it would be in the permanent maintenance corridor. The pipeline project may also impact habitat of *Fritillaria gentneri,* which is listed as Endangered under the federal Endangered Species Act. Out-planting to suitable habitat locations is recommended in the recovery plan for *Fritillaria gentneri*.	**Short-term adverse effects:** This activity would take place within the Pacific Connector pipeline corridor and would not result in any additional adverse impacts. **Long-term beneficial effects:** Beneficial impacts include helping to re-vegetate and stabilize the pipeline corridor and improving habitat for several listed or sensitive insect species.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	LWD Upland Placement	470 Acres	These projects are intended to mitigate for the loss of recruitment of LWD to adjacent stands and within the construction clearing zone. The pipeline project would forgo the development of LWD for the life of the project and for decades after. LWD is a constituent element of habitat for NSO and is a significant component of LSOG habitat. Replacement of LWD would partially mitigate for the barrier effect of the corridor by creating structure across the corridor for use by various wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID snag model). This type of project is consistent with NWFP Standards and Guidelines page C-11 (Forest Service and BLM 1994b). Acres that can be treated are necessarily limited by material available from the corridor.	**Short-term adverse effects:** Placement of LWD within and adjacent to the pipeline corridor would typically be done with heavy equipment that would drag the material into place. Heavy equipment use would increase the amount of detrimental soil damage within the treatment areas. By maintaining proper amounts of protective groundcover along with appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. LWD placement would create noise from heavy equipment that could disturb the NSO. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Beneficial effects include improving habitat for late-successional and other species and providing for long-term soil productivity.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Snag Creation	1,029 Acres	The creation of snags is intended to mitigate the loss of snag habitats within, and adjacent to the pipeline corridor. The pipeline project would prevent development of large snags during the life of the project and for decades after. Corridor construction would result in loss of snag habitat on approximately 775 acres associated with corridor construction (includes safety zone buffer). Various watershed analyses and LSR assessments indicate many areas traversed by the pipeline project are well below historic levels of snag habitat due to past management actions. The pipeline project would add to those cumulative impacts. As snags are a critical component of LSRs, replacement is needed. Snag requirements are specifically outlined in the BLM and Forests Service LMPs. Replacement would be immediate, though there would be a 10 year delay as snag decay occurs. Snag management is discussed in the NWFP for LSRs on pages C-14 and 15 (Forest Service and BLM 1994b). Snag management levels incorporated into these projects are based on the Forest's Plant Association Guidelines. The function and benefits of snags are also discussed in the South Cascades LSR Assessment (Forest Service, BLM et al. 1998: Chapter 3).	**Short-term adverse effects:** Snag creation typically employs the use of chainsaws or inoculum to kill live trees. As such there is little if any ground disturbance and only minimal noise disturbance. The potential for noise disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. Any adverse environmental impacts would be de minimus and very short term. **Long-term beneficial effects:** Beneficial impacts include the improvement of habitat for snag dependent species and in particular those species dependent on LSOG forests. Long-term benefits would also accrue as the created snags decay over time and eventually provide for large woody debris (LWD) on the forest floor improving habitat for many other species and contributing to long-term soil productivity.
	Noxious Week Treatments	6 Road Miles, 127 Acres	The construction and operation of the pipeline project has the potential to create vectors for noxious weeds. These treatments are intended to reduce populations of noxious weeds that are in close proximity to the pipeline project right-of-way, as well as restore meadow habitats in the fifth-field watersheds that are currently impacted by noxious weeds.	**Short-term adverse effects:** Treatments typically involve the cutting, pulling or spraying of noxious weeds. Since the work is typically done by hand there is minimal if any ground or noise disturbance. All activities would be conducted consistent with the most recent direction and plans for weed management and integrated vegetation management on BLM and Forest Service lands to minimize adverse impacts to plant and animal communities as well as water quality and aquatic habitats. **Long-term beneficial effects:** Long-term benefits would include the restoring of native plant populations and species diversity. Restoring native plant communities and increasing vegetation diversity generally contributes to restoring habitat for a broad group of animal species.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Visual Impacts on the Clover Creek Road		113 Acres	The pipeline project would create a hard visual line along the timbered edge of the corridor that does not fit with the agency's visual objectives for the Clover Creek Road or the Dead Indian Memorial Highway. Thinning and fuels treatments would be used to soften the edge to a more natural appearing texture by restoring stand density to more natural levels and creating small openings that are consistent with landscape. Thinning of commercial sized material would be accomplished with a commercial timber sale. The mitigation is intended to supplement funding for the non-commercial part of that work for visual purposes that could not otherwise be accomplished.	**Short-term adverse effects:** The commercial timber sale activities and resulting short-term adverse impacts would be similar to the impacts of the integrated stand density treatments described above. **Long-term beneficial effects:** The proposed activity would help mitigate the adverse visual impacts of the Pacific Connector pipeline along these road segments and would also create a fuel break and defensible space that could be used in helping to suppress high intensity wildfires.
Reallocation of Matrix Lands to Late Successional Reserves		1,896 Acres	This mitigation group contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the pipeline project. It also compensates for the removal of occupied MAMU habitat and suitable roosting, nesting and foraging NSO habitat. In addition, the selected parcels reduce the potential edge effects caused by management of matrix lands adjacent to occupied MAMU sites by reallocating the entire parcel to LSR. Reallocation of matrix lands to LSR also contributes to ACS objectives and may benefit Survey and Manage species over time by providing additional habitat that is managed to create LSOG stand conditions over time. Since the land reallocated to LSR on BLM-managed land comes out of the matrix, there is a need to replace those lands with other timber-producing lands to ensure that BLM continues to comply with requirements related to management of either Coos Bay Wagon Road or Oregon & California Railroad (O&C) lands. It is expected these lands would be acquired by the applicant and conveyed to the BLM to be managed as part of the matrix as either Coos Bay Wagon Road or O&C lands.	**Short-term adverse effects:** The reallocation of Matrix lands to LSR is an administrative action that would not have any immediate environmental consequences on the ground. **Long-term beneficial effects:** The proposed reallocation would change the management direction of approximately 1,896 acres from one of multiple uses with an emphasis on timber management to a management emphasis focusing on the creation and maintenance of late-successional forest habitat. Over time this reallocation would benefit species dependent on late-successional forests through management actions that would be designed to improve or maintain late-successional habitat conditions.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	**Project Type**	**Amount**	**Rationale**	**Environmental Consequences a/**

a/ For all project types additional field surveys for T&E species, Special Status species, and Heritage Resources would be completed where necessary before implementation. In addition, consultations with the FWS and NMFS as necessary would also be completed prior to implementation. All future decision making under NEPA for these projects would be completed consistent with the CEQ Regulations (40 CFR 1500-1508) and would tier to this EIS.

b/ The Northwest Forest Plan defines decommissioning as "To remove those elements of a road that reroute hillslope drainage and present slope stability hazards." Decommissioning generally restores natural drainage, removes unstable fill material, and establishes vegetation cover on the road surface to reduce erosion.

c/ The BLM and Forest Service use the term "design features" or "project requirements" rather than "mitigation" to describe elements of a plan that occur within a project area and are standard requirements of a project. The BLM and Forest Service reserve term "mitigation" to describe measures taken to reduce or compensate for otherwise unavoidable impacts.

Specific Off-Site Mitigation Projects on BLM and NFS Lands

Table 2.1.4-2 describes the individual mitigation projects related to LMP objectives on BLM and NFS lands that are included in the proposed action. These projects would be implemented by the BLM and Forest Service as a subsequent phase of the Pacific Connector Pipeline Project with funding provided by the applicant. The applicant is also responsible for providing funding to BLM and the Forest Service for planning efforts related to these mitigation actions.

TABLE 2.1.4-2

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
Coos Bay BLM	East Fork Coquille River	Reallocation of Matrix Lands to LSR and Acquisition	Land Re-Allocation from Matrix to LSR, Non-Federal Land Acquisition	RMP Amendment BLM – 4, LSR Reallocation and Land Acquisition	180	acres
		Aquatic and Riparian Habitat	LWD instream	Yankee Run In-stream Large Wood Placement	2.8	miles
		Fire suppression	Fire Suppression	Heli-Pond Construction	2	ea.
		Road Sediment Reduction	Road Surfacing	Road Surfacing –Yankee Run Spurs	0.9	miles
		Road Sediment Reduction	Road Surfacing	Road Surfacing –South Fork Elk Creek	2.6	miles
		Road Sediment Reduction	Road Surfacing	Road Surfacing –Yankee Run Mainline	2.0	miles
	Middle Fork Coquille River	Reallocation of Matrix Lands to LSR and Acquisition	Land Re-Allocation from Matrix to LSR, Non-Federal Land Acquisition	RMP Amendment BLM -4, LSR Reallocation and Land Acquisition	207	acres
		Aquatic and Riparian Habitat	LWD in-stream	Upper Rock Creek Instream LWD	2.1	miles
		Fire suppression	Fire Suppression	Heli-Pond Construction	1	ea.
		Road Sediment Reduction	Road Surfacing	Road Surfacing –Fall Creek System	0.9	miles
		Road Sediment Reduction	Road Surfacing	Bridge Approach paving –Sandy & Jones Creek Roads	2	ea.
	North Fork Coquille River	Aquatic and Riparian Habitat	LWD in-stream	Steinnon Creek In-stream LWD	1.5	miles
		Aquatic and Riparian Habitat	LWD in-stream	Upper North Fork Coquille In-stream LWD	2.2	miles
		Road Sediment Reduction	Road Surfacing	Bridge Approach paving – Woodward & Alder Creek Roads	2	ea.
Roseburg BLM	Clarks Branch South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Rice Creek Culvert Replacements	2	sites
		Road Sediment Reduction	Road Drainage – Culvert Replacement	East Fork Willis Creek Tributary Culvert Replacement	1	project
		Road Sediment Reduction	Road Drainage – Culvert Replacement	Judd Creek Culvert Removal	1	project
	Days Creek - South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Beal Creek Culvert Replacement	2	sites
		Aquatic and Riparian Habitat	LWD in-stream	Days Creek In-stream LWD	0.4	miles
		Aquatic and Riparian Habitat	LWD in-stream	West Fork Canyon Creek In-stream LWD	0.8	miles
		Road Sediment Reduction	Road storm-proofing	31-4-3.2 Road Storm-proofing	1	project
		Road Sediment Reduction	Road Drainage and Surface Enhancement	South Umpqua Road Drainage and Surface Enhancement	10.0	miles
		Stand Density Fuel Break	Fuels Reduction	Days Creek- South Umpqua Hazardous Fuel Reduction	1,000	acres

TABLE 2.1.4-2

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
	Days Creek - South Umpqua (1710030205), Myrtle Creek (1710030211), and Clarks Branch - South Umpqua (1710030210)	Fire Suppression	Suppression Capacity	Dry Hydrants	6	sites
	Middle Fork Coquille River	Aquatic and Riparian Habitat	Fish Passage	Loveseat Creek Culvert Removal	1	project
		Aquatic and Riparian Habitat	LWD in-stream	Middle Fork Coquille In-stream LWD Placement	0.6	miles
		Aquatic and Riparian Habitat	LWD in-stream	Twelvemile Creek Instream LWD	2.0	miles
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Camas Mountain Road Drainage and Surface Enhancement	3.5	miles
	Myrtle Creek	Aquatic and Riparian Habitat	Fish Passage	Slide Creek Culvert Replacement	1	project
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Ben Branch Road Drainage and Surface Enhancement	1.0	miles
		Road Sediment Reduction	Road Stabilization	South Myrtle Hill Slide Repair	1	project
	Olalla-Looking Glass	Acquisition	Land Re-Allocation from Matrix to LSR, Non-Federal Land Acquisition	RMP Amendment BLM-3, LSR Reallocation and Land Acquisition	409	acres
	Olalla-Looking Glass	Aquatic and Riparian Habitat	LWD in-stream	Olalla Creek In-stream LWD	1.2	miles
		Road Sediment Reduction	Road Stabilization	Olalla Tie Road Renovation	1	project
Medford BLM	Big Butte Creek	Fire suppression	Fire Suppression	Big Butte Creek Pump Chance	1	sites
		Road Sediment Reduction	Road storm-proofing	Big Butte Creek Road Storm-proofing	6.4	miles
		Terrestrial Habitat Improvement	Habitat Planting	Big Butte Creek Fritillaria Habitat	600	acres
	Little Butte Creek	Aquatic and Riparian Habitat	Fish Passage	Little Butte Creek Fish Screen	1	site
		Aquatic and Riparian Habitat	LWD in-stream	Lost Creek In-stream LWD	8.6	miles
		Fire suppression	Fire Suppression	Little Butte Creek Pump Chance	8	sites
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Little Butte Creek Road Improvement	3.5	miles
		Road Sediment Reduction	Road Decommissioning	Little Butte Creek Road Decommissioning Ashland Resource Area	10.6	miles
		Road Sediment Reduction	Road Decommissioning	Little Butte Creek Road Decommissioning Butte Falls RA	2.4	miles
		Road Sediment Reduction	Road Surfacing	Little Butte Creek Road Resurfacing Ashland Resource Area	9.0	miles
		Road Sediment Reduction	Road Surfacing	Little Butte Cr. Road Resurfacing, Butte Falls Resource Area	9.4	miles
	Shady Cove–Rogue River	Aquatic and Riparian Habitat	LWD in-stream	Shady Cove LWD	2.5	miles
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Shady Cove Road Improvement	1.0	mile
		Road Sediment Reduction	Road Surfacing	Shady Cove Road Resurface	1.5	miles
		Stand Density Fuel Break	Fuels Reduction	Shady Cove Fuel Hazard Reduction	866	acres
		Stand Density Fuel Break	Fuels Reduction	Shady Cove Fuel Hazard Maintenance	866	acres

TABLE 2.1.4-2

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
	Trail Creek	Aquatic and Riparian Habitat	LWD in-stream	Trail Creek LWD	2.6	miles
		Fire suppression	Suppression Capacity	Trail Creek Pump Chance	8	sites
		Road Sediment Reduction	Road storm-proofing	Trail Creek Road Storm-proofing	4.3	miles
		Road Sediment Reduction	Road Decommissioning	Trail Creek Road Decommissioning	2.7	miles
		Road Sediment Reduction	Road Surfacing	Trail Creek Road Resurface	16.3	miles
		Stand Density Fuel Break	Fuels Reduction	Trail Creek Fuel Hazard Reduction	687	acres
		Stand Density Fuel Break	Fuels Reduction	Trail Creek Fuels Hazard Maintenance	687	acres
Lakeview BLM	Spencer Creek	Riparian Stand Density	Riparian Vegetation	Upper Spencer Creek LSR/Riparian treatment	3.0	miles
	Spencer Creek	Riparian Stand Density	Riparian Vegetation	Miners Creek LSR, Riparian Treatment	3.0	miles
		Riparian Stand Density	Riparian Vegetation	Tributary Creek Riparian Thinning	70	acres
		Road Sediment Reduction	Road Drainage – Culvert Replacement	Keno Access Road Repair and Culvert Replacement	1	site
		Road Sediment Reduction	Road Drainage	Spencer Creek Drainage Improvements and Sediment Trap Removal	15	sites
		Road Sediment Reduction	Road Closure	Spencer Creek Repair Existing Road Closure	12	sites
		Terrestrial Habitat Improvement	Stand Density Habitat	Upper Spencer Creek LSR Density Management	270	acres
Umpqua National Forest	Days Creek - South Umpqua	Road sediment reduction	Road Closure	Days Creek -South Umpqua Road Closure	0.5	miles
		Stand Density Fuel Break	Fuels Reduction	Days Creek - South Umpqua Matrix Integrated Fuels Reduction	150	acres
		Stand Density Fuel Break	Fuels Reduction	Days Creek - South Umpqua LSR Integrated Fuels Reduction	232	acres
		Stand Density Fuel Break	Pre-commercial Thinning	Days Creek - South Umpqua. LSR Pre-commercial Thinning	53	acres
		Stand Density Fuel Break	Under-burn	Days Creek - South Umpqua LSR Under-burn	125	Acres
		Stand Density Fuel Break	Under-burn	Days Creek - South Umpqua Matrix Under-burn	102	acres
		Terrestrial Habitat Improvement	Snag Creation	Days Creek - South Umpqua LSR Snag Creation	32	acres
		Terrestrial Habitat Improvement	Snag Creation	Days Creek - South Umpqua Snag Creation	16	acres
	Elk Creek - South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Elk Creek Fish Passage Culverts	3	sites
		Road sediment reduction	Road Storm-proofing	Elk Creek Road Storm-proofing	1.6	miles
		Road sediment reduction	Road Closure	Elk Creek Road Closure	2.8	miles
		Road sediment reduction	Road Decommissioning	Elk Cr. Road Decommissioning	2.8	miles
		Stand Density Fuel Break	Fuels Reduction	Elk Creek LSR Integrated fuels	897	acres
		Stand Density Fuel Break	Fuels Reduction	Elk Creek Matrix Integrated Fuels Reduction	170	acres
		Stand Density Fuel Break	Pre-commercial Thinning	Elk Creek LSR Pre-commercial thinning	368	acres
		Stand Density Fuel Break	Under-burn	Elk Creek LSR Under-burn	472	acres
		Stand Density Fuel Break	Under-burn	Elk Creek Matrix Under-burn	115	acres

TABLE 2.1.4-2

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
		Terrestrial Habitat Improvement	LWD Upland Placement	Elk Creek LSR LWD Placement	103	acres
		Terrestrial Habitat Improvement	Meadow Restoration	Elk Creek Meadow Restoration	106	acres
		Terrestrial Habitat Improvement	Noxious Weed Treatment	Elk Creek Roadside Noxious Weeds	6.7	miles
	Elk Creek - South Umpqua	Terrestrial Habitat Improvement	Snag Creation	Elk Creek LSR Snag Creation	66	acres
		Terrestrial Habitat Improvement	Snag Creation	Elk Creek LSR Snag Creation	66	acres
		Terrestrial Habitat Improvement	Snag Creation	Elk Creek Matrix Snag Creation	13	acres
	Trail Creek	Road sediment reduction	Road Decommissioning	Trail Creek Road Decommissioning	1.1	miles
		Road sediment reduction	Road Storm-proofing	Trail Creek Storm-proofing	0.5	miles
		Stand Density Fuel Break	Fuels Reduction	Trail Creek Matrix Integrated Fuels Reduction	414	acres
		Stand Density Fuel Break	Under-burn	Trail Creek Matrix Under-burn	280	acres
		Terrestrial Habitat Improvement	Snag Creation	Trail Creek Matrix Snag Creation	109	acres
	Upper Cow Creek	Aquatic and Riparian Habitat	Fish Passage	Upper Cow Creek Fish Passage Culverts	4	sites
		Road sediment reduction	Road Closure	Upper Cow Creek Road Closure	2.6	miles
		Road sediment reduction	Road Decommissioning	Upper Cow Creek Road Decommissioning	4.3	miles
		Stand Density Fuel Break	Fuels Reduction	Upper Cow Creek LSR Integrated Fuels Reduction	972	acres
		Stand Density Fuel Break	Fuels Reduction	Upper Cow Creek Matrix Integrated Fuels Reduction	606	acres
		Stand Density Fuel Break	Under-burn	Upper Cow Creek LSR Under-burn	531	acres
		Stand Density Fuel Break	Under-burn	Upper Cow Creek Matrix Under-burn	410	acres
		Terrestrial Habitat Improvement	LWD Upland Placement	Upper Cow Creek LSR LWD Placement	62	acres
		Terrestrial Habitat Improvement	Noxious Weed Treatment	Upper Cow Creek Meadow Noxious Weeds	21	acres
		Terrestrial Habitat Improvement	Snag Creation	Upper Cow Creek LSR Snag Creation	91	acres
		Terrestrial Habitat Improvement	Snag Creation	Upper Cow Creek Matrix Snag Creation	14	acres
		Reallocation of Matrix Lands to LSR	Land Re-Allocation from Matrix to LSR	LRMP Amendment UNF -4, LSR 223 Reallocation	588	acres
Rogue River National Forest	Little Butte Creek	Aquatic and Riparian Habitat	LWD In-stream	South Fork Little Butte Creek. LWD	1.5	mile
		Aquatic and Riparian Habitat	Stream Crossing Repair	Little Butte Creek Stream Crossing Decommissioning	32	sites
		Road sediment reduction	Road Decommissioning	Little Butte Creek Road Decommissioning	53.2	miles
		Stand Density Fuel Break	Pre-commercial Thinning	Little Butte Creek LSR Pre-commercial Thin	618	acres
		Terrestrial Habitat Improvement	Habitat Planting	Little Butte Creek Mardon Skipper Butterfly	20	acres
		Terrestrial Habitat Improvement	LWD Upland Placement	Little Butte Creek LSR LWD Placement	306	acres

TABLE 2.1.4-2

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
	Little Butte Creek	Terrestrial Habitat Improvement	Snag Creation	Little Butte Creek LSR Snag Creation	622	acres
		Reallocation of Matrix Lands to LSR	Land Reallocation from Matrix to LSR	LRMP Amendment RRNF 7, LSR 227 Reallocation	12	acres
	Big Butte Creek	Reallocation of Matrix Lands to LSR	Land Reallocation from Matrix to LSR	LRMP Amendment RRNF 7, LSR 227 Reallocation	500	acres
Winema National Forest	Spencer Creek	Aquatic and Riparian Habitat	Riparian Planting	Spencer Creek Riparian Planting	0.5	miles
		Aquatic and Riparian Habitat	Fencing	Spencer Creek Fencing	6.4	miles
		Aquatic and Riparian Habitat	LWD In-stream	Spencer Creek In-stream LWD	1.0	miles
		Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Ford Hardening and Interpretive Sign	1	sites
		Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Stream Crossing Decommissioning	25	sites
		Road sediment reduction	Road Decommissioning	Spencer Creek Road Decommissioning	21.4	miles
		Visuals	Stand Density Reduction	Clover Creek Visual Management.	114	acres

a/ Acres are rounded to the nearest whole acre and miles to the nearest tenth of a mile.

2.1.5 Right-of-Way Grant to Cross Federal Lands

Pursuant to the Mineral Leasing Act of 1920 and in accordance with federal regulation 43 CFR Part 2880, the Pacific Connector Pipeline Project must secure a Right-of-Way Grant from the BLM to cross BLM, NFS, and Reclamation lands. Pacific Connector has applied to the BLM for a Right-of-Way Grant to cross federal lands. The BLM proposes to consider issuance of a Right-of-Way Grant that provides terms and conditions for construction and operation of the Pacific Connector Pipeline Project on federal lands in response to the proponent’s application. Issuance of the Right-of-Way Grant must be in accordance with 43 CFR Parts 2800 and 2880 and relevant BLM manual and handbook direction. In making this decision, BLM would consider several factors including conformance with land use plans and impacts on resources and programs. Following adoption of this EIS and receipt of concurrence from the Forest Service and Reclamation, the BLM would issue a ROD that documents the decision whether to issue the Right-of-Way Grant.

This Right-of-Way Grant would be in addition to any authorization for the Project issued by the FERC. The Right-of-Way Grant, if approved, would be authorized by issuance of a Temporary Use Permit for the pipeline clearing and construction, which would terminate upon completion of construction, and issuance of a Right-of-Way Grant for ongoing pipeline operations and maintenance for a 30-year term. The Temporary Use Permit contains the specific temporary construction and work areas necessary to build the Project. Once the Pacific Connector pipeline is constructed and in operation, the Right-of-Way Grant would be modified to reflect the final location of the project and the associated 50-foot-wide maintenance corridor plus any roads on federal lands or under federal easements that are necessary for operations.

Implementation and Monitoring of the BLM Right-of-Way Grant on Federal Lands

Monitoring is an essential element of project implementation (CEQ 2011). If the BLM issues a Right-of-Way Grant for the Pacific Connector Pipeline Project, that Grant would provide the terms and conditions for construction, operation, maintenance, and eventual termination of the facility on federal public lands. As cooperating agencies with jurisdiction by law for activities that occur on lands they administer, the BLM, Forest Service, and Reclamation have a responsibility to monitor implementation of the Pacific Connector Pipeline Project to assure that the terms and conditions of the Right-of-Way Grant are carried out (40 CFR 1505.3).

CEQ Regulations for NEPA (40 CFR 1505.2(c)) also require that a monitoring and enforcement program shall be adopted for any mitigation measures adopted as part of the decision to implement the Project. Many of the requirements of the POD that are a part of the BLM Right-of-Way Grant on federal lands are mitigation measures that reduce the environmental consequences of the Project. The BLM and Forest Service have also proposed an extensive off-site mitigation program. In addition to monitoring implementation of the Right-of-Way Grant, the BLM, Forest Service, and Reclamation also have a responsibility to monitor mitigation actions, whether those measures are a part of the POD or occur as part of an off-site mitigation program.

There are two types of monitoring that would be associated with administering the Right-of-Way Grant. "Implementation monitoring" seeks to verify that the project was implemented according to the terms of the Right-of-Way Grant. Implementation monitoring is typically a checklist exercise to verify that a project is implemented as planned and that requirements, terms, and conditions associated with the project are completed. Many of these elements would be addressed by FERC in the construction inspection process. As needed, agency representatives of the BLM, Forest Service, and Reclamation would participate in this process to assure that agency priorities are accomplished and agency obligations are fulfilled.

"Effectiveness monitoring" is the second type of monitoring. Effectiveness monitoring seeks to verify that the specific measures in the POD and in the off-site mitigation plan accomplished the desired objective. While virtually every important aspect of the project is subject to implementation monitoring, effectiveness monitoring is typically done on a smaller subset of actions. Where the outcomes of an action are well known and likely to be accomplished, effectiveness monitoring may not be needed, or may only be done on a sample basis. For example, the effects of surfacing roads are well known and not in question, so little if any effectiveness monitoring would be required for this activity. Conversely, some POD requirements or mitigation projects may have less certain outcomes or may be associated with thresholds such as water temperature. In those cases, effectiveness monitoring would be appropriate to ensure that the desired outcome is achieved. For example, in the East Fork of Cow Creek, the State of Oregon has established a threshold for water temperature impacts from management activities. Placing logs in and adjacent to perennial streams and planting shading vegetation is proposed to replace shade lost during construction clearing so that stream temperatures do not increase beyond established thresholds. Effectiveness monitoring would be appropriate in this circumstance to verify that stream temperatures in fact are not increased beyond the threshold. This also provides a trigger for adaptive management if the proposed mitigation is not entirely effective. Effectiveness monitoring requires interpretation of land management plan direction and objectives. Therefore, most effectiveness monitoring on federal lands would be accomplished by the agency having jurisdiction over the land being monitored.

Public comments received in response to the draft EIS will be used to focus monitoring efforts. The BLM, Forest Service, and Reclamation are developing a monitoring plan based on the "implementation" and "effectiveness" framework described above for inclusion in the FEIS. Key items that require specific monitoring include LMP elements for:

- LSRs;
- Riparian Reserves;
- Matrix Lands;
- Key Watersheds;
- specific elements of national forest LRMPs that may be more restrictive than the requirements of the NWFP; and
- specific recommendations of watershed analyses and LSR assessments.

The specifications of the POD were developed in part to ensure that the standards and guidelines of the agencies' LMPs, as amended, are met. Implementation monitoring of the POD would be evidence of compliance with these respective LMPs. For example, implementation monitoring would show that:

- measures specified in the POD to reestablish effective ground cover were accomplished and that additional steps were taken if the agencies' standards were not met;
- measures in the POD for wetland and water body crossings designed to protect the aquatic environment, such as maintaining sediment barriers at stream crossings, were taken;
- de-compaction measures in the POD designed to avoid or mitigate detrimental soil compaction, were undertaken; and
- the BLM and Forest Service off-site mitigation programs associated with the Pacific Connector Pipeline Project were accomplished as planned.

Effectiveness monitoring focuses on key resources and evaluates whether measures taken to protect the resource in question accomplished the desired objective. Implicit in effectiveness monitoring is a framework of adaptive management to ensure that objectives are achieved. Following are two examples.

- Sediment barriers would be required at stream crossings. If sediment barriers are installed, but effectiveness monitoring shows that the sediment barrier used did not work as planned, then additional measures would need to be taken to keep sediment from reaching stream channels.
- Measures to reestablish shade would be required at selected stream crossings where the analysis shows temperature is a potential issue. If the measures proposed are implemented, but prove to be ineffective, then additional actions to establish effective shade would be required.

Reporting results is a key element of a monitoring plan. The monitoring plan developed by the BLM, Forest Service, and Reclamation will include a reporting schedule and detailed criteria for judging completion and success of the actions being monitored. Implementation monitoring would typically be deemed complete when the action being monitored has been completely implemented. Effectiveness monitoring would not be complete until the project objectives have been accomplished.

2.1.6 Plan of Development on Federal Lands

Pacific Connector's right-of-way application to the BLM included a POD. The POD is a detailed description of the proposed action on federally administered lands and facilities and would be made a part of the Right-of-Way Grant. The POD includes 29 attachments. Twenty-eight of these attachments are individual plans detailing the Pacific Connector's proposed method for construction and operation of the proposed pipeline on federal lands (table 2.1.6-1). The POD also contains two unique agreements in principle for comprehensive mitigation plans developed collaboratively between the BLM and the Forest Service and Pacific Connector.

Table 2.1.6-1 lists the POD attachments. The draft POD was filed as a stand-alone document with Pacific Connector's application to the FERC, and is available for public review.

TABLE 2.1.6-1

Pacific Connector's POD Attachments

Attachment #	Attachment Title	FERC Stand-Alone Document Appendix Letter a/
1	Aesthetics Management Plan for Federal Lands	A
2	Air, Noise and Fugitive Dust Control Plan	B
3	Blasting Plan	C
4	Communication Facilities Plan	D
5	Contaminated Substances Discovery Plan	E
6	Corrosion Control Plan	F
7	Emergency Response Plan	G
8	Environmental Briefings Plan	H
9	Erosion Control and Revegetation Plan	I
10	Federally-listed Plant Conservation Plan	J
11	Fire Prevention and Suppression Plan	K
12	Fish Salvage Plan	L
13	Hydrostatic Test Plan	M
14	Integrated Pest Management Plan	N
15	Klamath Project Facilities Crossing Plan	O
16	Leave Tree Protection Plan	P
17	Overburden and Excess Material Disposal Plan	Q
18	Prescribed Burning Plan	R
19	Recreation Management Plan	S
20	Right-of-Way Clearing Plan for Federal Lands	U
21	Right-of-Way Marking Plan	T
22	Safety & Security Plan	V
23	Sanitation and Waste Management Plan	W
24	Spill Prevention, Containment and Countermeasures Plan	X
25	Transportation Management Plan	Y
26	Unanticipated Discovery Plan	Z
27	Upper Rock Creek ACEC	AA
28	Wetland and Waterbody Crossing Plan	BB
29	Compensatory Mitigation Plan b/	CC
	Environmental Alignment Sheets	DD

a/ Pacific Connector included the POD Attachments in its application to the FERC by these letters.
b/ The measures outlines in the applicant's Compensatory Mitigation Plan would be implemented on private and state lands; however, the BLM/Forest-Service mitigation measures outlined in appendix F of this EIS would be implemented on federally-managed lands. The federal land-management agencies and the applicants will continue to work together to revise the CMP to include all mitigation measures that would be implemented by the Project on private, state, and federal lands.

2.1.7 Mitigation on Non-Federal Lands

Both Jordan Cove and Pacific Connector have developed mitigation plans for environmental impacts occurring on non-federal lands as part of their proposed action (table 2.1.7-1). In addition, unless otherwise stated, most of the POD attachments apply to non-federal lands as well. Mitigation and BMPs are discussed in conjunction with the respective affected resources in chapter 4 of this EIS.

TABLE 2.1.7-1

Proposed Mitigation Plans

Mitigation Plan	EIS Section(s)	Description	Reference
Jordan Cove LNG Terminal and Pacific Connector Pipeline			
Compensatory Mitigation Plan (CMP), Jordan Cove LNG Terminal, Marine Facilities, and Pacific Pipeline Project	Sections 2.1.6, 4.6.1, 4.6.2	Developed to compensate for impacts of the Jordan Cove (Jordan Cove) Energy and Pacific Connector Gas Pipeline Project that cannot be avoided, further minimized, or otherwise mitigated, in conjunction with the other avoidance and mitigation strategies and commitments that are currently embedded in the Proposed Action.	Attachment 29 to Pacific Connector's POD; updated version included as Appendix O of the Biological Assessment filed with FERC under Docket #CP13-492 on April 16, 2014
Jordan Cove LNG Terminal			
Wildlife Habitat Mitigation Plan	Section 4.6.1, appendix S	Developed to comply with the ODFW Fish and Wildlife Habitat Mitigation Policy under OAR 635-415-000 to 00025. Provides for long-term preservation of habitat off-site from the Project.	Filed with FERC under Docket #CP13-483 on May 22, 2014.
Compensatory Wetland Mitigation Plan	Section 4.4.3	To offset unavoidable impacts to wetland habitats as required by Section 401 and 404 of the Clean Water Act (CWA).	Attached as Appendix M.2 of Resource Report 2, included in Jordan Cove's May 2013 application; updated version filed with FERC under Docket #CP13-483 on April 23, 2014
Pacific Connector Pipeline			
Mitigation Plan for Federal Lands	Section 2.1.4, appendix F	Identifies extensive off-site mitigation program on BLM and NFS lands. These projects are included as part of the Proposed Action to ensure that the objectives of the affected BLM and Forest Service land management plans are achieved.	Attached as appendix F to this EIS
Olympia Oyster Mitigation Plan	Section 4.6.2	Describes the Pacific Pipeline Project's opportunity to protect existing populations of Olympia oysters and to have a net benefit to Olympia oysters within Coos Bay.	Within CMP in Appendix O, Attachment 8 of the Biological Assessment
Groundwater Supply Monitoring and Mitigation Plan	Section 4.4.1	Includes a discussion of identification of groundwater resources, determination of susceptibility to impacts and monitoring and mitigation if required for the protection of groundwater supply wells and springs and seeps.	Appendix 2F of Resource Report 2 of Pacific Connector's June 2013 application
Site-Specific Residential Mitigation Plans	Section 4.1.2 and appendix I	For the residences within 50 feet of construction work areas, Pacific Connector has developed site-specific drawings depicting the temporary and permanent rights-of-way and has noted special construction techniques and mitigation measures	Appendix 8F of Resource Report 8 of Pacific Connector's June 2013 application
Compensatory Wetland Mitigation Plan	Section 4.4.3	To offset unavoidable impacts to wetland habitats as required by Section 401 and 404 of the CWA.	Within CMP in Appendix O, Attachment 9 of the Biological Assessment
Large Woody Debris Plan	Sections 4.6.2 and 4.7.1	Specifies placement of LWD within the construction right-of-way at stream crossings or in riparian zones within ranges of the SONCC and Oregon Coast coho ESUs	Within CMP in Appendix O, Attachment 6 of the Biological Assessment
Federally-Listed Plant Conservation Plan	Section 4.7.1	Includes botanical mitigation plans for: Applegate's milk-vetch, Gentner's fritillary, Kincaid's lupine, and Cox's mariposa-lily.	Within CMP in Appendix O, Attachment 5 of the Biological Assessment
Historic Properties Management Plan	Section 4.11.1	The SHPO accepted the Treatment Plans produced in August 2010 (HRA 2010) for 18 historic properties along the Pacific Connector pipeline route that cannot be avoided On June 3, 2011, the SHPO signed an MOA for resolving adverse effects at the 18 historic properties.	A final HPMP would be filed with the FERC prior to any Project-related construction.

2.2 NON-JURISDICTIONAL FACILITIES

In addition to the facilities discussed in section 2.1, the JCE & PCGP Project would require construction of facilities that do not fall under the Commission's jurisdiction. These include a power plant associated with the proposed LNG terminal, the SORSC, facilities constructed to provide utility service to various jurisdictional meter stations and a compressor station, and activities conducted by the Port. Because the non-jurisdictional power plant, SORSC, and utility services to Pacific Connector meter stations are directly related to the Project, we will analyze the environmental impacts of their construction and operation throughout chapter 4 of this EIS.

The Port activities are not fully developed and are not related to the Project, and therefore will only be discussed in the Cumulative Impacts section (4.14) of this EIS.

2.2.1 LNG Vessels

LNG to be exported from the Jordan Cove terminal to overseas markets would be transported in vessels specially designed and built for that task. Jordan Cove expects that its terminal would be visited by about 90 LNG vessels per year. These vessels would be loaded with LNG at the terminal and deliver the cargo to customers, most likely around the Pacific Rim. LNG vessels would be under the ownership and control of third-parties, not Jordan Cove, and would not be regulated by the FERC. The third-party owners and operators of the LNG vessels would have agreements with Jordan Cove for the transportation of the LNG to designated ports or customers. We do not have any information about the exact vessels that would be used to transport the LNG from the terminal. However, the Coast Guard WSR and LOR limit the size of LNG vessels that would call at the Jordan Cove terminal to not larger than 148,000 m^3 in capacity. Neither do we know the exact destinations for the LNG cargo, nor the specific routes across the Pacific Ocean to customers that would be taken by LNG vessels, outside of the waterway within 12 miles of the Oregon Coast. Therefore, LNG vessel design and ocean transportation routes outside of the waterway close to shore will not be further analyzed in this EIS.

2.2.2 South Dunes Power Plant

To provide power to the LNG terminal, Jordan Cove would construct and operate the South Dunes Power Plant. This new power plant would be located on about 58 acres on the northeast side of geographic Jordan Cove, at the former site of the Menasha-Weyerhaeuser linerboard mill, closed in 2003 and since demolished. The site is currently clear of any standing structures, with the exception of a water tank and the PacifiCorp Jordan Point electric substation. The substation would be relocated after construction of the new power plant.

A new switchyard with generator transformers would be constructed on-site to switch/direct the power produced by both power blocks. The voltage would be stepped up to 230 kV for transmission to the LNG terminal. The electric line between the power plant and the LNG terminal would be located within Jordan Cove's utility corridor (discussed in section 2.1.1.10 above).

The South Dunes Power Plant would produce a nominal 420 MW of electrical power and process steam for gas conditioning prior to delivery to the terminal liquefaction trains. The plant would consist of two 170 MW blocks of high efficiency combined cycle combustion turbine generation. Three combustion turbine generators (CTG), three heat recovery steam generators (HRSG), and one steam turbine generator (STG), would collectively compose each power block, adding approximately 40 MW to each 170 MW block for a total output of 420 MW. Each CTG would produce electricity, with the exhaust gases from the CTGs supplying heat to the HRSGs. Steam produced in the HRSGs would be used to power the STGs to produce additional electricity and process steam. Duct burners fueled by natural gas in the HRSGs would allow for production of additional steam and additional electricity from the STGs when needed. Steam exhausted from the STGs would be condensed in air-cooled condensers, with the resultant condensate returned to the HRSGs to remake steam.

The CTGs, HRSGs, and STGs would be outdoor units, given the relatively moderate ambient conditions of the area. The HRSGs would be the tallest structures on the South Dunes Power Plant site at approximately 100 feet tall. A control and administrative building would provide space for plant controls and offices for plant personnel (these buildings are listed on table 2.1.1.11-1 above).

Fuel would be supplied primarily in the form of BOG from the LNG terminal. Some additional natural gas would be supplied from the Pacific Connector pipeline, which would connect to a metering station to be located in the southern portion of the South Dunes Power Plant site. Jordan Cove's pipeline natural gas conditional facility would be situated on the west side of the power plant.

Raw water would be supplied to the power plant by the CBNBWB through an existing pipeline (as discussed above in section 2.1.1.11). A separate water treatment area would provide a location for the equipment necessary to purify the raw water, producing demineralized water for use in the power plant steam cycle and amine solution for CO_2 removal.

As discussed in section 1.5.4.2 of this EIS, the South Dunes Power Plant would be authorized by the ODOE-EFSC.

2.2.3 Southwest Oregon Regional Safety Center

The SORSC would occupy approximately 8 acres on the east side of Jordan Cove Road, between the Trans-Pacific Parkway and the Roseburg Forest Products property, west of the South Dunes Power Plant. The building would house the Jordan Cove Fire Company, offices for the Coos County Sherriff, Coast Guard, and the Port, and a training facility for the Southwestern Oregon Community College. Although this building does not come under the jurisdiction of the FERC, this EIS analyzes impacts resulting from its construction.

2.2.4 Utility Connections

Electrical power and telephone service would be required for each of the meter and compressor stations. Installation of the utility connections is not regulated by the FERC. Pacific Connector stated that no permits are required for the purchase of power or telephone service to the compressor station and meter stations.

Both electric power and telephone infrastructure currently exist along Malin Loop Road and More Lock Road, to the south and west of the proposed Klamath Compressor Station and its associated meter stations. Pacific Connector could purchase electricity from Pacific Power, which would have to install a standard single phase 400 amp meter base for the service drop from the existing distribution line. For telephone service, a standard telephone service pedestal would have to be installed by Cal-Ore Telecommunications (figure 2.2-1).

There is existing electric power available on the west side of the newly proposed location for the Clarks Branch Meter Station. Power would be purchased from Pacific Power, which would need to install a standard single phase 200 amp meter base to tie-into the distribution line. A new telephone cable would have to be installed by Qwest from its existing line along Dole Road up the newly proposed PAR 71.46 to the meter station (figure 2.2-2).

Electric power and telephone service would be available to Pacific Connector's proposed new Jordan Cove Meter Station from facilities already in place within the Jordan Cove terminal. The Pacific Power substation would be relocated by Jordan Cove east of the proposed meter station, and a service drop would consist of a standard single phase 200 amp meter base. Jordan Cove would provide voice and data communications directly to the meter station (figure 2.2-3).

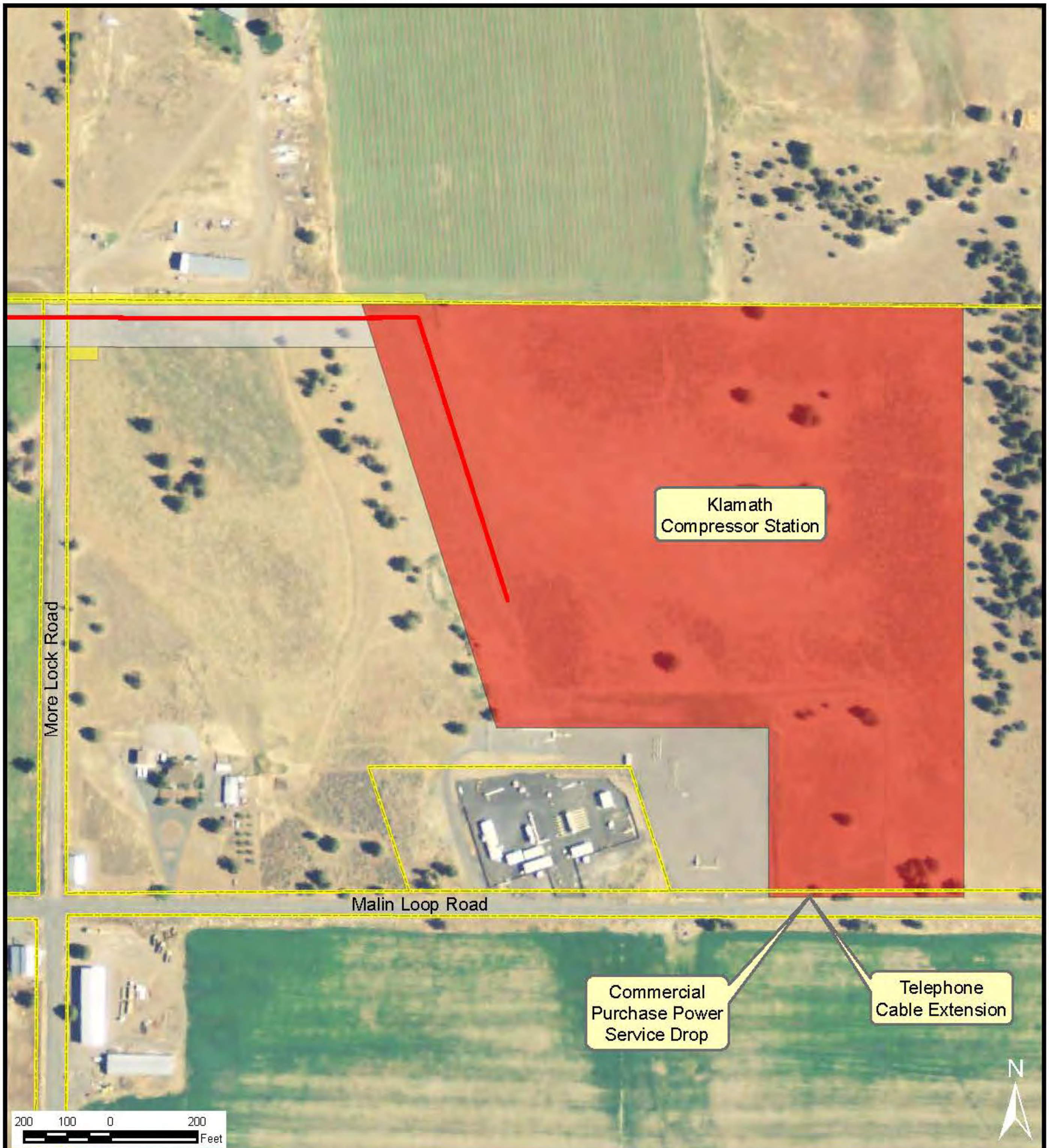


Figure 2.2-1
Non-jurisdictional Facilities Associated with Klamath Compressor Station T.41S., R.12W, Section 11

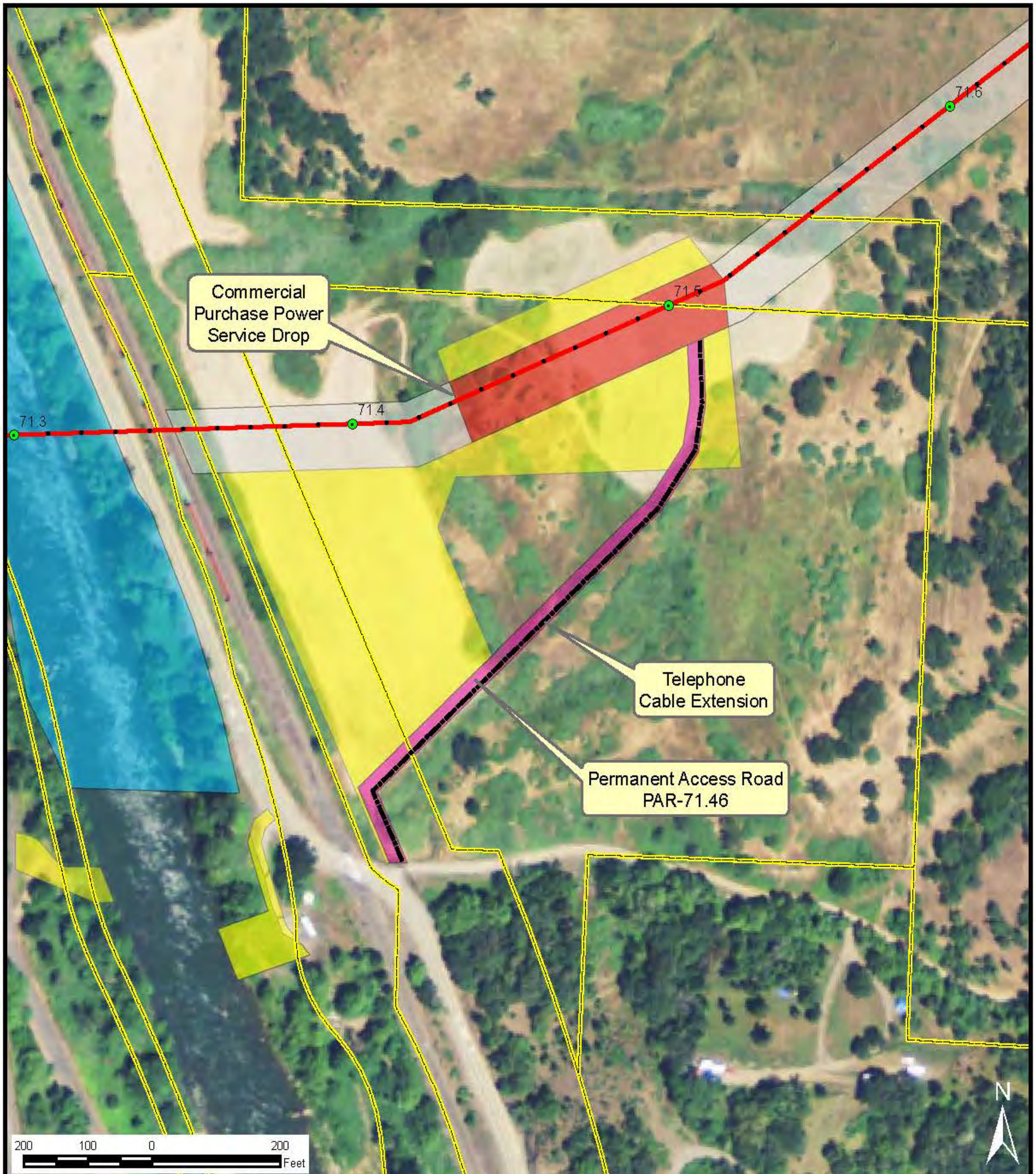


Figure 2.2-2
Non-jurisdictional Facilities Associated with Clarks Branch Meter Station T.29S., R.6W., Section 2

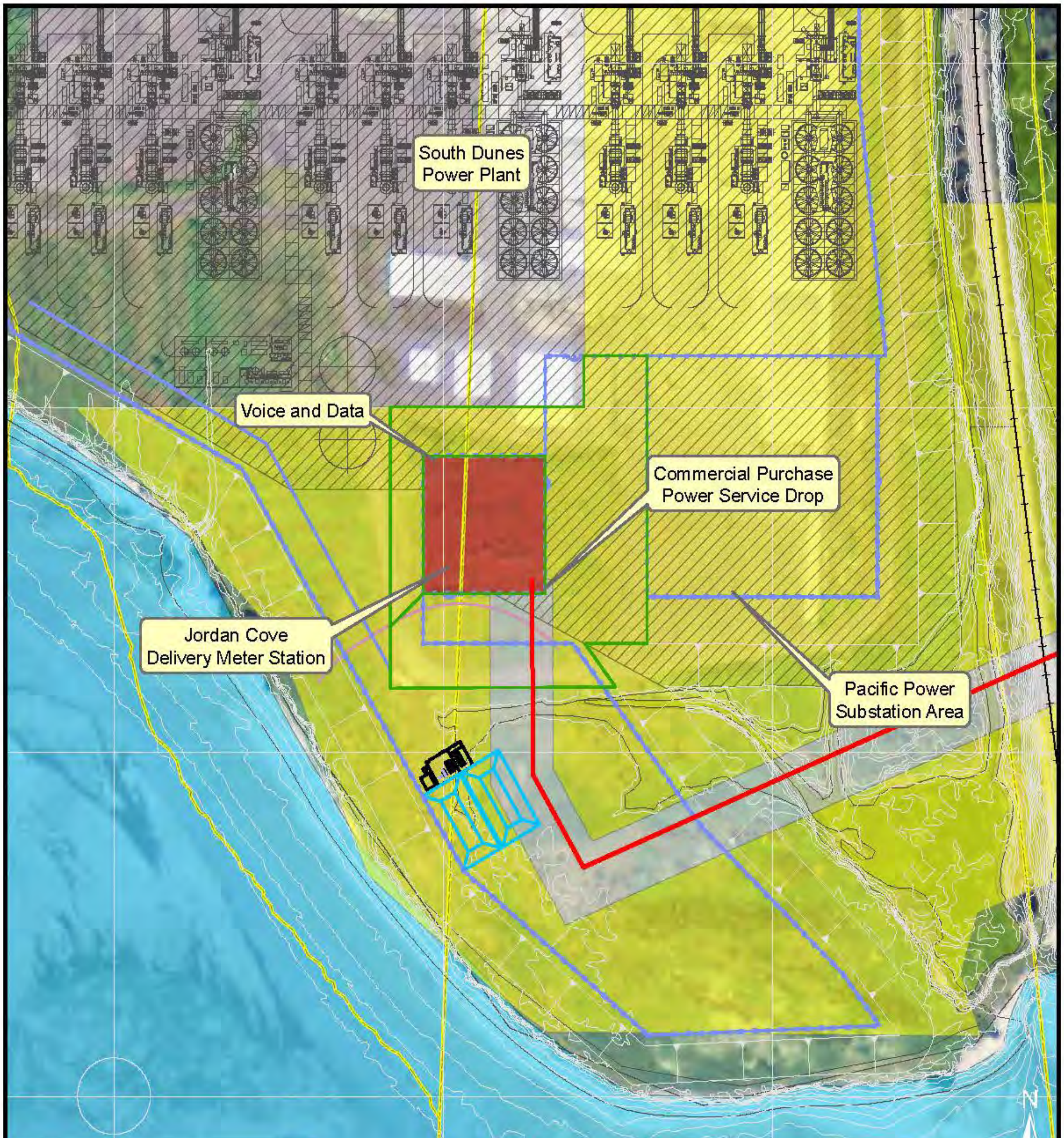


Figure 2.2-3
Non-jurisdictional Facilities Associated with Jordan Cove Meter Station T.25S., R.13W., Section 3

2.2.5 Port Activities

The Port is pursuing multiple different future marine terminal development projects. One of those projects is called the "Oregon Gateway Marine Terminal Complex." This complex would include the Jordan Cove LNG terminal berth on the east side of the proposed marine slip, and an un-specified commercial berth on west side of the slip. The Port has indicated that it is considering a dry bulk terminal for silo-storage cargos (i.e., grain, soy beans, etc.) served by the west berth. The Port's conceptual drawing on its webpage of this dry bulk cargo terminal on the west side of the Jordan Cove marine slip shows it overlapping Henderson Marsh.

In 2011, the Port entered into an exclusive arrangement with unnamed partners to export coal brought by train to Coos Bay. However, in May 2013 those partners backed out of the agreement. D.B. Western is still pursuing the concept of establishing a coal shipping terminal adjacent to its facility on the North Spit (as later discussed in section 3.3.1.2 of this EIS).

The Port is also promoting an intermodal container terminal complex, to cover about 293 acres at Henderson Marsh, on the east side of the Jordan Cove LNG terminal. The conceptual drawing of the container terminal, posted on the Port webpage, shows a ship berth within Coos Bay, on the north side of the existing navigation channel, east of Jordan Cove's marine slip.

In January 2008, the Port entered into a MOA with the COE for guidance related to analyzing channel improvements in Coos Bay under Section 203 of the Water Resources and Development Act. In January 2014, the Port informed the COE of its intent to convert the project into an evaluation under Section 204 of the Water Resources and Development Act, and began negotiating a new MOA. At this time, neither the Port nor the COE have produced an environmental analysis of the future channel expansion project.[7]

In March 2012, the Port signed an agreement with Principal Power to use the west side of the Jordan Cove slip, including a portion of Henderson Marsh, for the on-site manufacture and assembly of five semi-submersible wind platforms, that would then be towed to sea. As discussed in section 3.3.2.2, Principal Power was awarded a grant for a pilot study of the potential to anchor five 6 MW wind turbines about 3 miles off the Oregon coast opposite Coos Bay. The Principal Power proposal is one of seven DOE grants, and it is not yet clear if it would be selected for full project funding.

No entity has yet executed an agreement with the Port to develop a commercial cargo terminal on the west side of the Jordan Cove marine slip. Furthermore, Jordan Cove would enter into an exclusive lease with the Port for use of the marine slip that would require any future developer to seek permission from Jordan Cove to use the west side of slip. Also, Jordan Cove would construct a berm on the west side of the slip to protect Henderson Marsh, that may preclude development in this area.

There is no direct relationship between the Port's planned channel improvement project and the Jordan Cove LNG Project. The LNG vessels that would use the Coos Bay waterway to Jordan Cove's terminal are limited by the Coast Guard to under 148,000 m^3 in capacity, and those vessels can transit through the existing Coos Bay navigation channel without it being made any deeper or wider. However, the proposed future components of the Port's Oregon Gateway Project, including

[7] Under Section 204 of the Water Resources and Development Act, a non-federal sponsor can fund the project. In June 2014, the Port indicated that it would have a consultant produce an Administrative Draft EIS for the channel improvement project in 2016.

the cargo or container terminal and Principal Power wind turbine assembly proposal, are further considered in this EIS under Cumulative Impacts in section 4.14.

2.3 LAND REQUIREMENTS

Tables 2.3.1-1 and 2.3.2-1 summarize the land requirements for the facilities proposed as part of the JCE & PCGP Project. Land requirements for each component of the Project are described below. Land use is further discussed in section 4.1.

2.3.1 Jordan Cove Liquefaction Project Facilities

The upland facilities of Jordan Cove's liquefaction and LNG export terminal, excluding the access channel and marine slip, eastern utility corridor, gas processing and South Dunes Power Plant area, the relocated industrial and raw water pipelines, and preserved wetlands and sand dunes, would occupy about 89 acres of open grasslands and brush and forested dunes west of the existing Roseburg Forest Products property, east of Henderson Marsh, and south of the Trans-Pacific Parkway. This area, when owned by Weyerhaeuser, was called the Ingram Yard, but was once historically part of what was known as the Henderson Ranch. In addition, the Jordan Cove terminal would include support buildings and a utility corridor totaling about 19 acres on the north side of the Roseburg Forest Products tract. On the northern and eastern shore of geographic Jordan Cove, east of the Roseburg Forest Products tract, about 79 acres would be used for the Jordan Cove natural gas processing area, and its non-jurisdictional South Dunes Power Plant and associated facilities, including the SORSC, excluding preserved wetlands. This area is the former location of the Menesha-Weyerhaeuser linerboard mill which operated between 1961 and 2003, and was once historically part of what was known as the Jordan Ranch.

During construction of the combined Jordan Cove liquefaction and LNG export terminal, and related power plant complex, about 397 acres would be disturbed. An additional 49.3 acres would be disturbed as part of wetland mitigation activities. About 251 acres would be retained for operational facilities. Jordan Cove owns about 295 acres at the terminal and power plant complex, with additional temporary construction areas leased from other private landowners. Table 2.3.1-1 lists the land requirements for the Jordan Cove Liquefaction Project.

TABLE 2.3.1-1

Land Requirements for the Jordan Cove Liquefaction Project

Facilities	Land Area (acres) a/	Acres Affected During Construction	Acres Affected During Operation
JURISDICTIONAL FACILITIES			
Access Channel and Marine Slip	66	66	66
LNG Transfer Line ("Marine Access Pipeway")	9	9	9
LNG Storage Tank Area	27	27	27
Liquefaction Process Area	20	20	20
Refrigerant Storage Area	2	2	2
Ground Flare	1	1	1
Terminal Fire Water Ponds	4	4	4
North Terminal Access	4	4	4
LNG Vessel Berth	3	3	3
Terminal Operator Building and Warehouse	8	8	8
Utility Corridor and East Access Road	11	11	11
Gas Treatment Plant	13	13	13
Stormwater Pond	11	11	11
Jordan Cove Meter Station b/	0	0	--
Industrial Wastewater Pipeline Relocation	13	13	5
Raw Water Pipeline Extension	3	3	1
North Point Workforce Housing Project Bridge	<1	<1	<1

TABLE 2.3.1-1

Land Requirements for the Jordan Cove Liquefaction Project

Facilities	Land Area (acres) a/	Acres Affected During Construction	Acres Affected During Operation
Total Acres for Terminal Facilities	**195**	**195**	**185**
NON-JURISDICTIONAL FACILITIES			
South Dunes Power Plant	58	58	58
Southwest Oregon Regional Safety Center	8	8	8
Total Acres for Non-Jurisdictional Facilities	**66**	**66**	**66**
TEMPORARY CONSTRUCTION AREAS			
Heavy Equipment Haul Road at Roseburg Forest Products Property	8	8	0
Slurry and Return Water Pipelines at Roseburg Property	1	1	0
Terminal Construction Trailers c/	0	0	0
Tank Staging Area **c/**	0	0	0
Concrete Batch Plant Area d/	0	0	0
Tank Roof Fabrication Area e/	0	0	0
Process Staging Area e/	0	0	0
Construction Offices at Roseburg Property	1	1	0
Laydown Area at Roseburg Property	13	13	0
Open Areas	11	11	0
Parking at Roseburg Property	<1	<1	0
Craft Areas at Roseburg Property	<1	<1	0
Warehouse/Storage at Roseburg Property	1	1	0
Fabrication Areas at Roseburg Property	4	4	0
LNG Vessel Berth Dune Area f/	15	15	0
Northern Terminal Sand Dune Area	7	7	0
Laydown Area	21	21	0
Gas Processing Plant Laydown Area	4	4	0
North Point Workforce Housing Project	48	48	0
Total Acres for Temporary Construction Areas	**136**	**136**	0
PRESERVED EASEMENT AREAS			
Eastern Henderson Marsh	11	0	0
Northeastern Terminal Wetlands Area	28	0	0
Western South Dunes Power Plant Wetlands Area	7	0	0
Total Acres for Preserved Easement Areas	**45**	**0**	**0**
MITIGATION SITES g/			
West Jordan Cove Wetland Mitigation Site h/	3.7	3.7	0.0
West Bridge Wetland Mitigation Site h/	2.0	2.0	0.0
Kentuck Slough Mitigation Site	43.6	43.6	0.0
Wildlife Habitat Mitigation Areas i/	259.4	0.0	0.0
Total Acres for Wetland Mitigation Sites	**308.7**	**49.3**	**0.0**
GRAND TOTAL	**706**	**446**	**251**

a/ Acres rounded to the nearest whole acre, except for mitigation sites. If acreage is less than 1 acre, reported as "<1". Columns may not sum correctly due to rounding.
b/ Acres impacted by the Jordan Cove Meter Station are accounted for by the Pacific Connector pipeline and associated aboveground facilities in section 2.3.2.
c/ Within LNG Storage Tanks Area
d/ Within Terminal Firewater Pond Area
e/ Within Liquefaction Trains Process Area
f/ Includes 1.5 acres for removal of the existing Roseburg Water Tanks
g/ Acreages here rounded to nearest tenth of an acre.
h/ Acreage greater than total compensatory mitigation acreage due to additional land disturbance.
i/ Jordan Cove is acquiring a total of 581 acres at three off-terminal locations; however, only 259.4 acres are planned for mitigation use.

2.3.2 Pacific Connector Pipeline and Associated Aboveground Facilities

Pacific Connector would use about 5,938 acres to construct its proposed project, and about 1,437 acres would be retained for the permanent operational easement. Table 2.3.2-1 lists the land requirements for the proposed Pacific Connector Pipeline Project.

TABLE 2.3.2-1

Land Requirements for the Pacific Connector Pipeline Project

Project Component	Length (miles) or Number of Sites a/	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Right-of-Way	232 miles b/	2,698	1,399 c/
Temporary Extra Work Areas	1,676 sites	1,095	(99) d/
Uncleared Storage Areas	287 sites	673	0
Rock Source & Disposal Sites	44 sites	70 e/	(70) d/
Contractor and Pipe Storage Yards	38 sites	1,339	0
Existing Roads Needing Improvements	65 roads	22	(22) f/
Temporary Access Roads	14 roads	5	0
Permanent Access Roads	13 roads	3	3
Aboveground Facilities	17 sites	32 g/	35 g/
Hydrostatic Discharge Locations Outside Right-of-Way	6	1	0
Totals		**5,938**	**1,437**

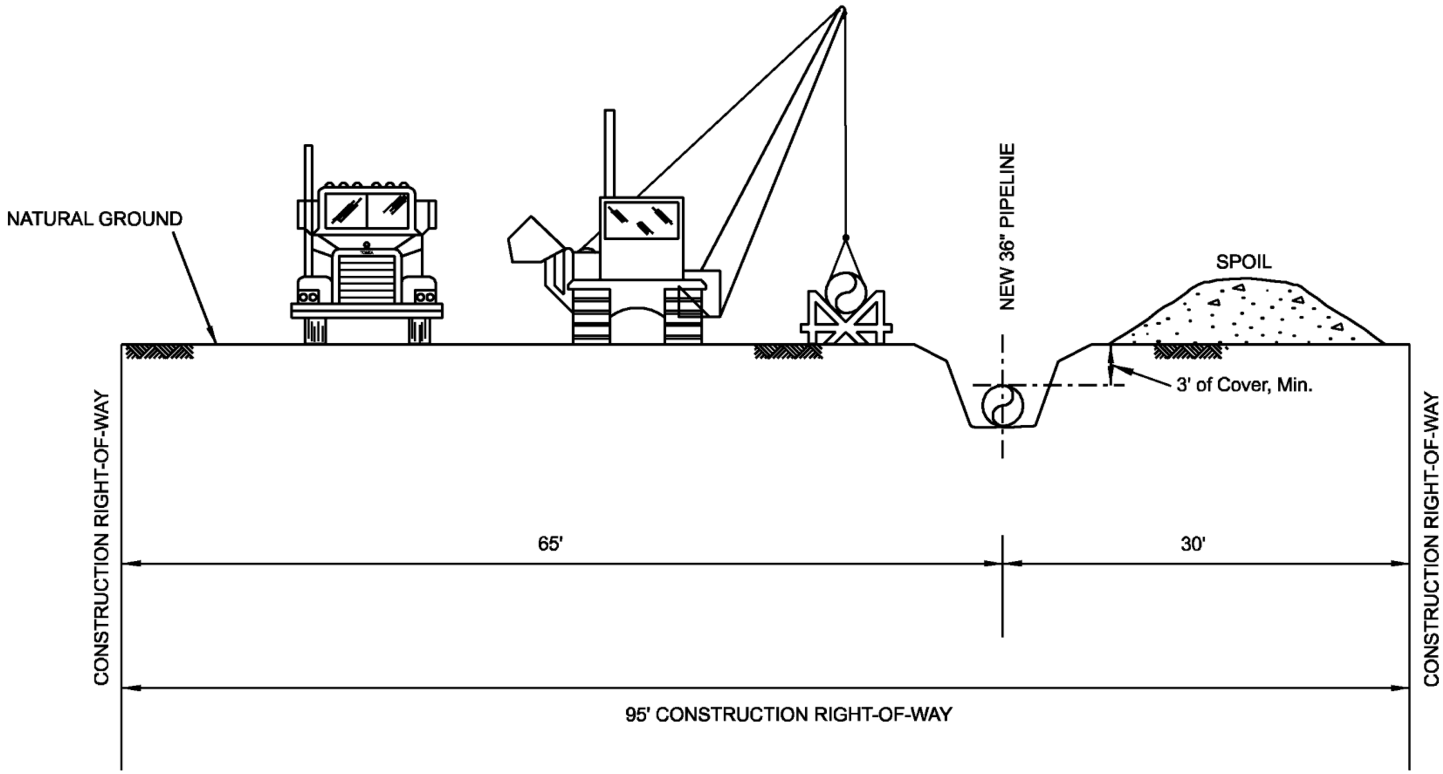
a/ All miles and acres are rounded up to a whole number.
b/ Because of realignments, the length of the pipeline is different from the MPs which reflect the original 2007 route.
c/ 50-foot-wide permanent pipeline easement. Does not include approximately 6 acres of subsurface HDD and direct pipe procedures.
d/ Includes TEWAs, existing quarries, rock sources, and disposal areas that may be used as permanent storage areas. These areas would not be used during operation of the Project, and therefore are not included in the operational total.
e/ An additional 98 acres of rock source and disposal sites are accounted for as part of Temporary Extra Work Areas, for a total of 168 acres of rock source and disposal area.
f/ While the improvements would not be reclaimed, these roads would not be used for operations and the acres are not included in the total operational acreage.
g/ Construction impacts associated with the aboveground facilities are included in the construction land requirement for the pipeline right-of-way except the potential communication tower sites and the Klamath Compressor station, which are included here (approximately 1 acre and 31 acres, respectively).

2.3.2.1 Pipeline

Construction Right-of-Way

Pacific Connector proposes to use a standard 95-foot-wide construction right-of-way to install the pipeline. This width for the construction right-of-way would be needed to accommodate clearing and grading activities, store spoil, and provide a passing lane for equipment. The right-of-way would be used as the primary transportation corridor during construction. A typical right-of-way cross section is shown in figure 2.3-1.

Where feasible (i.e., where topographic conditions allow) at wetland crossings, the construction right-of-way would be narrowed to 75 feet in width to reduce impacts. See additional discussion in section 4.4 of this EIS.



NOTE: 95' CONSTRUCTION RIGHT-OF-WAY TYPICAL FOR LEVEL TERRAIN WITH NO CONSTRUCTION OBSTACLES.

LOCATIONS REQUIRING ADDITIONAL WORK SPACE ARE
- TOP SOIL AREAS
- UNLEVEL TERRAIN
- ROAD AND STREAM CROSSINGS
- HORIZONTAL DRILLING

Figure 2.3-1
Typical Pipeline Right-of-Way Cross Section

About 2,698 acres would be affected during construction of the pipeline, within the standard right-of-way. Temporary construction workspace outside of the 50-foot-wide permanent easement would be restored after construction to its original use. The restoration and revegetation of the temporary construction right-of-way would be done in accordance with Pacific Connector's *Erosion Control and Revegetation Plan* (ECRP).[8]

Temporary Extra Work Areas

In addition to the standard 95-foot-wide construction right-of-way, Pacific Connector would use TEWAs where site-specific characteristics would require additional space. Most TEWAs would be cleared of vegetation, and some would be graded as necessary to create safe work space for construction activities. Generally, TEWAs would be required for (but not limited to) the following:

- steep slopes and side sloping areas to accommodate cuts and spoil storage requirements;
- bore pits and spoil storage at road and railroad crossings;
- spoil storage, staging, and construction of specialized pipeline drag sections such as at wetland crossings, residential/industrial areas, and road crossings;
- waterbody and wetland crossings;
- road crossings;
- pipe and equipment staging;
- areas where tie-ins require additional trench widths to allow workers to enter the trench and perform welds and to ensure Occupational Safety and Health Administration (OSHA) trench safety requirements are met;
- sharp angles or points of intersection (PIs) where additional area is required to account for the wide turning radius of pipe stringing trucks (which are more than 100 feet in length);
- topsoil segregation areas to ensure stockpiled topsoil and subsoils are not mixed;
- off right-of-way dewatering areas; and
- timber staging/decking during right-of-way clearing.

About 1,676 TEWA sites, totaling approximately 1,095 acres, would be required to install the pipeline. All of these areas would be disturbed only temporarily during pipeline construction, and would be restored and revegetated afterwards, in accordance with Pacific Connector's ECRP.

Uncleared Storage Areas

During design of the construction area requirements for the pipeline, Pacific Connector identified the need for additional work areas in various locations such as forested areas; in areas of steep slopes; and in areas where the route follows narrow ridgelines. In an attempt to minimize forest clearing, especially in areas of older forest, Pacific Connector proposes to use some of these temporary work areas as uncleared storage areas (UCSA) rather than TEWAs. Unlike TEWAs, UCSAs would not be cleared of trees during construction. UCSAs would be used to store forest

[8] The ECRP was attached as Appendix 1B in Resource Report 1 of Pacific Connector's June 2013 application to the FERC, and included as Attachment 9 of Pacific Connector's POD.

slash, stumps, dead and downed log materials that would be removed from the construction work area before construction, and then scattered back across the right-of-way after construction. Pacific Connector anticipates that the amount of this type of material encountered within the construction right-of-way would be large enough to hinder construction activities if it were stored on the right-of-way.

In some locations, the UCSAs may be used to store spoil or to temporarily park equipment between the mature trees. However, storage and temporary parking of equipment/vehicles would not occur immediately adjacent to any trees so as to minimize impacts (soil compaction or tree damage). In extremely steep and side sloping topography, the UCSAs may be required as a contingency location to contain rock, which rolls beyond the construction limits. Along extremely steep and narrow ridgeline areas, logs, slash, and dead and downed material may be used as cribbing to contain excavated materials during construction (right-of-way grading and trenching activities). During restoration, some of the materials that are pulled out of the cribbing may roll beyond the construction limits. Where feasible, Pacific Connector would retrieve materials that have rolled downhill using cables and chokers attached to standard on-site restoration equipment (i.e., bulldozers and trackhoes) to winch the material back to the right-of-way. There may be some cases where retrieval of the lost cribbing material may cause more harm to resources than allowing it to remain where it settled. On federal lands, Pacific Connector would protect trees within the UCSAs in accordance with the procedures outlined in its *Leave Tree Protection Plan* (Attachment 16 of its POD).

Pacific Connector has identified 287 UCSA locations adjacent to the construction right-of-way, affecting a total of about 673 acres. The amount of spoil or woody debris that would be stored within UCSAs, or which pieces of equipment may be temporarily parked within UCSAs is not possible to estimate at this time, but would be determined as construction progresses. After construction, the UCSAs would be restored to their previous condition and use.

Hydrostatic Test Water Discharge Sites

Pacific Connector has identified 75 locations along the proposed route where hydrostatic test water would be released within the construction right-of-way during testing of the pipeline. At these locations, the hydrostatic test water would be discharged into temporary erosion control basins, typically constructed of hale bales and silt fence, in upland areas (see section 4.4.2 for a full discussion of hydrostatic testing).

Pacific Connector identified six hydrostatic test water discharge locations that would be outside of the construction right-of-way, TEWAs, or UCSAs. At those six locations, small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes or chainsaws. A rubber-tired or track hoe would be used to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge. About 1 acre would be affected by hydrostatic discharge outside of the right-of-way.

Permanent Operational Pipeline Right-of-Way

Pacific Connector would retain a 50-foot-wide permanent easement for the long-term operation and maintenance of the pipeline. The permanent easement for the pipeline would cover approximately 1,405 acres.

Existing Access Roads

About 660 existing roads would be used for access to the pipeline right-of-way during construction. Existing roads that would be used for construction access are listed in table D-2 in appendix D of this EIS. Construction access roads are also shown on the pipeline facility maps in appendix C. The use and crossing of access roads are more fully discussed in section 4.10.

Pacific Connector would obtain the necessary permits or approvals from appropriate federal, state, and county government agencies prior to use of the roads, and would obtain landowner permission for the use of existing private roads. As part of its application to the FERC, Pacific Connector filed a *Transportation Management Plan* (TMP) for federal lands as Attachment 25 of its POD, and as Appendix 8H to Resource Report 8 for non-federal lands. The TMPs detail the measures, standards, and stipulations to be employed in the construction, use, improvement, and maintenance of roads.

Pacific Connector may need to widen or improve portions of some existing access roads to accommodate construction equipment. Pacific Connector has estimated that modifications of 60 miles of existing access roads may be required outside of the existing road bed (e.g., widening corners to allow for the longer turning radius of larger vehicles), resulting in about 22 acres of disturbance.

During use of existing roads for construction, paved surfaces would be kept clear of large accumulations of mud and other debris. Dirt roads may be maintained by grading, or covered by aggregate. Appropriate sediment and erosion control devices would be installed along dirt roads used during wet weather or the rainy season to contain potential impacts to the road surface.

New Temporary Access Roads

Pacific Connector has identified 14 locations where it would be necessary to construct new temporary access roads (TARs), totaling approximately 2.4 miles in length. Construction of the new TARs would impact a total of about 5 acres. Following construction, TARs would be removed and the affected areas restored to pre-construction conditions.

New Permanent Access Roads

Pacific Connector proposes to construct 13 new PARs for access to the pipeline right-of-way and aboveground facilities. These roads, totaling about 0.9 mile, would provide access during construction as well as during operations and maintenance activities. Most of the new PARs would be within Pacific Connector’s permanent pipeline easement. Construction and operation of the PARs would impact a total of about 3 acres.

Contractor and Pipe Storage Yards

Pacific Connector has identified 38 potential sites for yards and rail ports that may be used during construction to off-load and store pipe and stage contractor equipment in the pipeline project area. These sites are generally not along or immediately adjacent to the proposed pipeline. Criteria for identification of potential contractor and pipe yards were existing industrial sites that have been previously graded and graveled, are near the proposed pipeline, and which have rail service to the yard. All of the sites are privately owned. Pacific Connector would secure the pipe storage yards and rail ports that would be used for construction during the easement acquisition phase. Use of all of the identified sites would affect an estimated 1,339 acres. Actual use of the potential sites would depend on the availability of these sites at the time of easement negotiations.

Rock Source and Permanent Disposal Sites

Pacific Connector has identified 44 potential rock source/disposal sites, which total approximately 168 acres. These sites are indicated on the Mapping Supplement filed by Pacific Connector with its June 2013 application. Of these locations, 26 sites are existing quarries/gravel pits or abandoned quarries/gravel pits. Although some of the existing/abandoned sites appear to have land use types other than quarries/gravel pits, Pacific Connector would not expand these sites beyond the existing or previously disturbed footprints.

Cathodic Protection System

Pacific Connector would protect its pipeline from corrosion over time through a cathodic protection (CP) system. The CP system would consist of a number of sites where below ground rectifier/anode beds would be installed that input a low voltage electrical charge into the pipeline. These rectifier/anode beds would typically be spaced about 15 to 20 miles apart, usually installed within the previously disturbed pipeline construction right-of-way. Each CP site would use electric power from a nearby local utility source. If a deep well would be installed, it would require a truck-mounted drill rig to drill up to 300 feet deep within a 10-inch diameter area. A horizontal anode bed would require the use of a standard backhoe for installation within an area up to 500 feet long by 15 feet wide and 5 feet deep. The CP system would be installed about one year after the pipeline would be constructed, to allow the trench to stabilize and for collection of post-construction data on electro-conductivity soil potentials, which is required before the system can be designed and installed. Pacific Connector would consult with appropriate federal, state, and local regulatory agencies after pipeline construction to acquire the permits necessary for the CP system.

2.3.2.2 Aboveground Facilities

Land required for construction and operation of the proposed aboveground facilities is listed in table 2.3.2-1. Construction and operation of the proposed aboveground facilities would require about 35 acres.

2.3.2.3 Pipeline Facilities on Federal Lands

Tables 2.3.2.3-1, 2.3.2.3-2, and 2.3.2.3-3 list land requirements for those portions of the Pacific Connector pipeline and associated facilities that would be within or would affect lands administered by the BLM, Forest Service, and Reclamation, respectively.

TABLE 2.3.2.3-1

Land Administered by the BLM Affected by the Pacific Connector Pipeline Project

Facilities	Length or Number of Sites	Land Affected During Construction (acres) a/	Land Affected During Operation (acres)
Pipeline right-of-way	40 miles	456	242/145 b/
Hydrostatic test water discharge locations outside the right-of-way	1	<1	0
TEWAs	308	159	0
UCSAs	108	170	0
Rock source and disposal sites	4	7	0
Existing roads needing improvements in limited locations	10	8	0
Temporary access roads (TARs)	1	<1	0
Permanent access roads (PARs)	3	<1	<1
MLVs	3	<1	<1
Communication Sites	4	<1	<1
Total	**—**	**801**	**243**

a/ Acreages are rounded to nearest whole acre. If acreage is less than 1 acre, reported as "<1." Columns may not sum correctly due to rounding.
b/ The first value is the area within permanent operational right-of-way. The second value is the area that would be affected by the 30-foot corridor where brush control would be performed during operation of the pipeline.

TABLE 2.3.2.3-2

Land Administered by the Forest Service Affected by the Pacific Connector Pipeline Project

Facilities	Length or Number of Sites	Land Affected During Construction (acres) a/	Land Affected During Operation (acres)
Pipeline right-of-way	31 miles	352	186/111 b/
Hydrostatic discharge locations outside the right-of-way	0	0	0
TEWAs	198	107	0
UCSAs	64	126	0
Rock source and disposal sites	1	2	0
Existing roads needing improvements in limited locations	10	<1	0
Temporary access roads (TARs)	0	0	0
Permanent access roads (PARs) c/	1	<1	<1
MLVs c/	1	<1	<1
Communication Sites	1	<1	<1
Total	**—**	**588**	**186**

a/ Acreages are rounded to nearest whole acre. If acreage is less than 1 acre, reported as "<1." Columns may not sum correctly due to rounding.
b/ The first value is area within permanent operational right-of-way. The second value is area that would be affected by the 30-foot corridor where brush control would be performed during operation of the pipeline.
c/ Pacific Connector has agreed to move MLV #9 off of Forest Service land and therefore the associated PAR is no longer needed. Impact tables will be updated per FERC requirements in the FEIS.

TABLE 2.3.2.3-3

Land Administered by Reclamation Affected by the Pacific Connector Pipeline Project

Facilities	Length or Number of Sites	Land Affected During Construction (acres) a/	Land Affected During Operation (acres)
Pipeline right-of-way	1 mile	4	2/1 b/
Hydrostatic discharge locations outside the right-of-way	0	0	0
TEWAs	0	<1	0
UCSAs	0	0	0
Rock source and disposal sites	0	0	0
Existing roads needing improvements in limited locations	0	0	0
Temporary access roads (TARs)	0	0	0
Permanent access roads (PARs)	0	0	0
MLVs	0	0	0
Communication Sites	0	0	0
Total	**—**	**4**	**2**

a/ Acreages are rounded to nearest whole acre. If acreage is less than 1 acre, reported as "<1." Columns may not sum correctly due to rounding.
b/ The first figure is the area within the permanent operational right-of-way. The second figure is the area that would be affected by the 30-foot corridor where brush control would be performed during operation of the pipeline.

Pacific Connector Pipeline

The Pacific Connector pipeline would cross about 40 miles of BLM lands, 31 miles of NFS lands, and about 1 mile of land administered by Reclamation. However, between MPs 200.5 and 214.2 the pipeline would cross 26 irrigation facilities under Reclamation's jurisdiction. We estimate that the nominal pipeline construction right-of-way of 95 feet would affect about 456 acres of BLM lands, 352 acres of NFS lands, and 4 acres of Reclamation lands, not including Reclamation's Klamath Project irrigation facilities. The 50-foot permanent right-of-way would affect about 242 acres of BLM lands, 186 acres of NFS lands, and 2 acres of Reclamation lands.

We identified 308 TEWAs on BLM lands, affecting a total of about 159 acres, and 198 TEWAs on NFS lands, affecting about 107 acres. We counted 108 UCSAs located on BLM lands, affecting about 170 acres, and 64 UCSAs on NFS lands, affecting about 126 acres. No TEWAs or UCSAs would be located on Reclamation lands.

Nineteen of the discharge locations for hydrostatic test water within the pipeline construction right-of-way would be on BLM land, and 7 would be on NFS lands. Of the hydrostatic test water release areas outside of the pipeline construction right-of-way, one location would be on BLM land affecting less than one-tenth of an acre.

All or portions of 138 existing roads that would be used to access the pipeline right-of-way are on BLM lands, 58 access roads are on NFS lands, and 11 roads under Reclamation jurisdiction. Pacific Connector would make modifications to 10 existing roads on BLM lands, affecting about 8 acres, and disturb less than an acre along 10 existing roads crossing NFS lands. See additional discussion of access roads in section 4.10.

Pacific Connector proposes to construct one new TAR across BLM lands affecting about less than 1 acre. Three new PARs would be constructed across BLM lands, permanently affecting about one-quarter of an acre. One new permanent road on Forest Service land would affect about one-tenth of an acre.

Five of the rock source or disposal areas outside of identified TEWAs proposed for use by Pacific Connector during pipeline construction are located on BLM land, covering a total of about 7 acres. There is one rock source or disposal location on NFS lands outside of identified TEWAs, totaling about 3 acres.

Aboveground Facilities

Three MLVs would be on BLM lands, affecting a total of about 0.2 acre. These include MLV #4 and MLV #7 within the Roseburg District, and MLV #12 within the Medford District. Four of the communication tower sites (Blue Ridge, Signal Tree, Flounce Rock, and Stukel Mountain) are on BLM lands, affecting a total of about 0.75 acre. Blue Ridge and Signal Tree are managed by the Roseburg District, Flounce Rock by the Medford District, and Stukel Mountain by the Lakeview District. One communication tower site (Robinson Butte), affecting about a quarter acre, would be within the Rogue River National Forest. MLV #9 and its associated PAR would be moved off of NFS land, as discussed in section 2.1.2.2.

2.4 CONSTRUCTION PROCEDURES

This section describes the general procedures proposed by Jordan Cove and Pacific Connector for construction of the LNG terminal and pipeline facilities. Refer to section 4 of this EIS for more detailed discussions of proposed construction and restoration procedures as well as measures that we are recommending to mitigate environmental impacts.

Under the provisions of the Natural Gas Pipeline Safety Act of 1968, as amended, Jordan Cove would design, construct, operate, and maintain the LNG terminal facilities in accordance with the DOT's Liquefied Natural Gas Facilities: Federal Safety Standards (49 CFR 193). The loading facilities and any appurtenances located between the LNG vessels and the last valve immediately before the LNG storage tank would be required to comply with applicable sections of the Coast Guard regulations in Waterfront Facilities Handling Liquefied Natural Gas (33 CFR 127).

The proposed pipeline facilities would be designed, constructed, operated, and maintained in accordance with DOT regulations in Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (49 CFR 192). Among other design standards, these regulations specify pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welders and operations personnel. In addition, Pacific Connector would comply with the siting and maintenance requirements of the FERC's regulations at 18 CFR 380.15, and other applicable federal and state regulations.

Jordan Cove would construct the terminal facilities in accordance with its project-specific *Erosion and Sediment Control Plan* (ESCP), its *Upland Erosion Control, Revegetation, and Maintenance Plan* (Jordan Cove's *Plan*) and its *Wetland and Waterbody Construction and Mitigation Procedures* (Jordan Cove's *Procedures*).[9] Jordan Cove adopted the FERC's *Plan* and

[9] Jordan Cove's ESCP was attached as Appendix B.7 in Resource Report 7 and Jordan Cove's *Procedures* attached as Appendix C.2 in Resource Report 2, as part of the Environmental Report included with Jordan Cove's application to the FERC filed May 21, 2013.

Procedures (May 2013 versions) into its *Plan* and *Procedures* in their entirety; therefore, there are no differences between Jordan Cove's and FERC's *Plan* and *Procedures*.

Pacific Connector would construct its facilities in accordance with the FERC's *Plan* and *Procedures* except where they have requested site-specific modifications. The locations for which Pacific Connector is requesting modifications are listed in appendix P of this EIS. Pursuant to the FERC's *Procedures*, Pacific Connector prepared an SPCCP.[10] Also in accordance with the FERC's *Procedures*, Pacific Connector committed to preparing a *Stormwater Pollution Prevention Plan* (SWPPP), which would be submitted to the ODEQ to obtain a General Stormwater Discharge Permit. That permit application would be made between one year and six months prior to scheduled pipeline construction; therefore, Pacific Connector has not yet provided a draft SWPPP for our review.

Jordan Cove's proposed LNG terminal and Pacific Connector's proposed pipeline and associated aboveground facilities would be constructed in various phases. A description of the primary construction phases is provided below.

2.4.1 Jordan Cove's LNG Terminal

2.4.1.1 North Point Workforce Housing Complex

Prior to construction of any terminal facilities, Jordan Cove would construct a temporary workers camp in North Bend, at the south side of the McCullough Bridge, referred to as the North Point Workforce Housing Complex (figure 2.4-1). The camp would occupy about 48 acres, currently owned by Al Pierce Lumber Company and used for staging piles of logs prior to further transport. Jordan Cove would lease this property, which is currently zoned for heavy industrial use by the City of North Bend. Jordan Cove would make improvements to the site such as a connection to the City of North Bend sanitary sewer and road work, including a bridge to connect one part of the property to another across a small creek. The majority of the housing complex would be developed at the existing grade of about elevation 30 feet.

Development of the North Point site would occur in two phases. Phase 1 would develop the east side of the property including the roadway, access improvements, utility corridor, and bridge crossing to the west side. Phase 2 would involve the installation of the housing units and central accommodation facilities on the west side, as well as parking on the east side. The site would be developed over time as needed to support the Jordan Cove Project. Housing units and central accommodation facilities would be constructed similar to modular housing using conventional wood framing construction methods. Modules would be pre-manufactured off-site and delivered

[10] Pacific Connector attached its SPCCP as Appendix 2B to Resource Report 2 in its June 2013 application to the FERC.

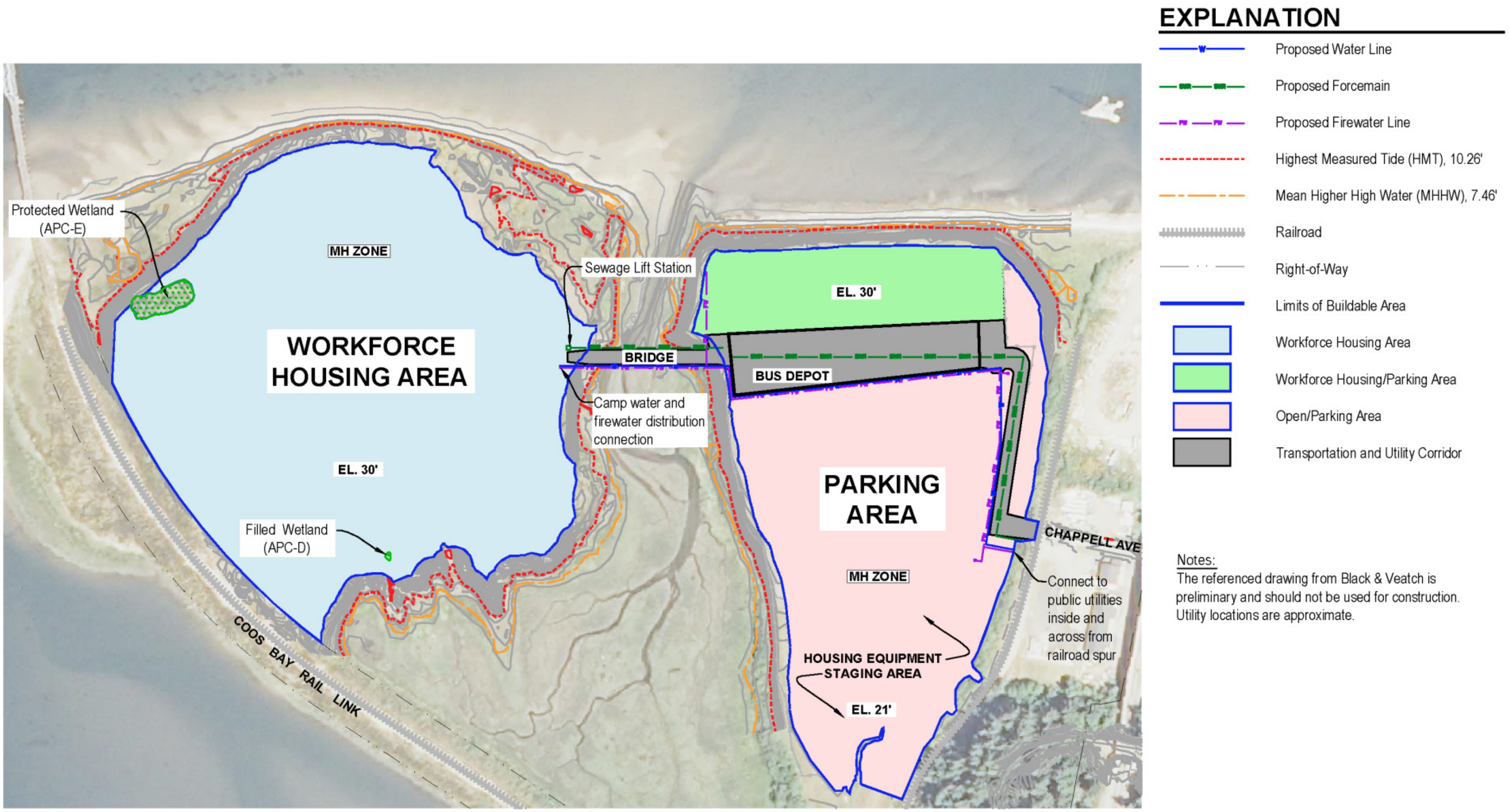


Figure 2.4-1

Plan of the Temporary North Point Workforce Housing Complex

Scale: 1" = 400'

Source:
Black & Veatch

to the site via truck. On-site utilities for the workforce housing would include a potable water system, firewater and hydrant loop system, wastewater collection and pumping system, and electrical service for power.

The camp would be designed to accommodate approximately 2,000 workers. Jordan Cove estimates an average construction workforce of almost 800 workers (792) over the life of the construction phase (42 months), with an average of 40 to 50 lodging staff needed on the site during the same time period.

2.4.1.2 Other Pre-Construction Activities and Temporary Construction Facilities

Jordan Cove would have to establish some temporary construction facilities at the terminal site prior to constructing the terminal facilities. A concrete batch plant would be situated on the south side of the Trans-Pacific Parkway, north of where the LNG storage tanks would be located. Field supervision trailers would be set up south of the location of the LNG storage tanks and north of the proposed marine slip. On land leased temporarily from Roseburg Forest Project, Jordan Cove would erect field construction management offices, subcontractor staff offices, warehouse and storage buildings, craft trailers, and craft breakroom. A temporary construction barge dock would be built at the southeastern corner of the marine slip, on the bay, west of the Roseburg Forest Products tract.

2.4.1.3 Materials and Equipment Deliveries

Jordan Cove is considering delivering materials and equipment to the terminal site by roads, rail, and marine transport. Roads to the Jordan Cove LNG terminal include U.S. Highway 101 and the Trans-Pacific Parkway. Jordan Cove produced a *Transportation Impact Analysis Update* to study the potential impact of worker, material, and equipment transport by roads to the Jordan Cove terminal.[11] This study and other transportation issued are discussed in more detail in section 4.10.1 of this EIS. There is an existing railroad to the terminal site, known as the Coos Bay Rail Link, now owned and operated by the Port. Jordan Cove may bring in materials and equipment to the terminal on this railroad, and may also use the railroad to transport workers to the site. Materials and equipment could also be brought to the terminal by barges using the existing Coos Bay navigation channel.

2.4.1.4 Access Channel and Slip

Prior to any other construction work on the upland portion of the slip, Jordan Cove would locate, excavate, and remove the existing CBNBWB industrial wastewater pipeline that currently runs through the terminal property across the planned access channel and then generally along the same route proposed for the gas pipeline. A new industrial wastewater pipeline would then be installed running parallel to the Trans-Pacific Parkway (figure 2.1-13). Water discharged through this pipeline would be temporarily halted for about a week during the relocation. Relocation of the industrial wastewater pipeline would affect about 13 acres (see table 2.3.1-1).

[11] The transportation study was attached as Appendix B.5 of Resource Report 5 in Jordan Cove's May 2013 application to the FERC.

Roseburg Forest Products currently uses two 1 million gallon water tanks located on the forested dune on the west side of its property. Jordan Cove proposes to remove those water tanks. Roseburg Forest Products would then tap into the new 12-inch-diameter CBNBWB raw water pipeline on the North Spit for its water supply needs. However, if an analysis proves that the new CBNBWB water line cannot sufficiently supply the needs of Roseburg Forest Products, Jordan Cove may decide to leave the two existing water tanks in place.

Jordan Cove proposes to construct the terminal marine slip and access channel in three phases, to reduce turbidity and impacts on aquatic resources in Coos Bay. The first phase would be the dry excavation of the upper level of the upland portion of the proposed marine berth, above the underground water table. The second phase, known as the “fresh water” phase, would be the dredging of the lower level of the upland portion of the marine slip, below the underground water table, north of a berm retained to separate the upland from the bay. The third phase, known as the “salt water” phase, would include the removal of the berm, and the dredging of the far southern portion of the slip and the entire access channel in the bay.

Phase 1 – Dry Excavation of the Slip

Clearing and Grubbing

The upland portion of the proposed terminal marine slip currently consists of two types of topography: (1) natural forested sand dunes on the east; and (2) a level area on the west, created from materials dredged from Coos Bay and placed on the site by the COE during the early 1970s, covered with low scrubs and grasses. The merchantable timber from the portions of the forested dunes to be removed would be salvage logged and sold, while the unmerchantable timber, timber slash and brush would be pulverized in a tub grinder and stockpiled as mulch. The mulch would be saved for future erosion control of recontoured sand dunes created during the construction process. Only surfaces that need to be recontoured to accommodate the slip or supporting structures would be grubbed and cleared.

Dry Excavation

The existing ground surface in the flat area is at an elevation of approximately +20 feet NAVD88. The water table across the proposed slip occurs at an elevation of approximately +10 feet NAVD88. All excavated material above an elevation of approximately +10 feet NAVD88 would be removed by conventional earthmoving equipment such as scrapers, bulldozers, and front-end loaders. A berm would be maintained on the south side of the slip area, as a barrier to the bay during this construction phase. Contouring of the slip perimeter above +10 feet NAVD88 would be performed during this step. Side slopes of 3 feet horizontal to 1 foot vertical (3H:1V) would be maintained around the perimeter of the slip to maintain slope stability; except where the LNG berth sheet pile would be installed. The materials stockpiled for future mulching operations would be applied as ground cover to the newly exposed sandy slopes to prevent erosion upon completion of the site contouring of elevations above +10 feet NAVD88.

About 2.3 mcy of material would be excavated from the marine slip area during this phase. The excavated material would be transported by trucks to the process area on the north side of the terminal parcel and to the South Dunes Power Plant area, to raise the elevations of these areas. The trucks to the South Dunes Power Plant area would use the proposed haul road across the Roseburg Forest Products tract (see figure 2.1-9).

Phase 2 – Fresh Water Dredging of the Slip

Excavation of Dredge Launch Pond

Several wide-tread excavators would be used to remove material down to elevation 0.0 feet NAVD88, thereby creating a 300-foot-long by 200-foot-wide by 10-foot-deep launch pond. The launch pond would be located near the slip perimeter and road access. The material would be moved to the upland disposal sites by trucks as described above. The launch pond would receive the equipment that would be used to complete the dredging of the upland portion or slip.

Dredging the Upland Portion of the Slip North of the Berm

One or more disassembled hydraulic dredge plants would be transported to the terminal slip area by truck. The hydraulic dredge plants may be in the 18-inch to 24-inch size range, since this is the maximum size range for transportability and the minimum size range capable of dredging to an elevation of -45 feet NAVD88. The plants would be assembled on-site and lifted by crane into the dredge launch pond.

The hydraulic dredges would create an ever increasing deep prism that would, in the end, fully define the dimensions of the slip north of the berm. The slip would be dredged to its final depth of -45 feet NAVD88, with side slopes at a ratio of 3H:1V. Dredging of the slip north of the berm could be done any time of the year, with no effects on the bay and its resources.

A total of about 1.5 mcy of material would be dredged from the upland portion of the slip north of the berm (see table 2.1.1.11-1). The hydraulic dredges are capable of generating a slurry of 30 percent solids by weight at a flow rate of 6,000 gpm or greater. All the material dredged below the water table north of the berm would be hydraulically transported to the South Dunes Power Plant area through a 20-inch-diameter fused polypropylene (seamless) slurry pipeline. The slurry pipeline would be about 8,650 feet in length, and would be laid on the ground surface, on top of the rip-rap along the southern shore across the Roseburg Forest Products tract.

The dredged material would be deposited at the former Weyerhaeuser linerboard mill site, to raise the elevation for the proposed Jordan Cove facilities at that location, including the gas treatment plant and the South Dunes Power Plant. Once the slurry has settled, decant water would be removed and transported back to the terminal slip via a 20-inch-diameter fused polypropylene (seamless) pipeline. The decant pipeline would be placed on the ground adjacent to the slurry pipeline. Together installation of the slurry and decant water pipelines would affect about 1 acre.

Driving Piles for Slip Structures

The LNG vessel berth would include four breasting structures and six mooring structures. All of the mooring dolphins for the LNG vessel berth would be constructed “in-the-dry” and as such, piles would be driven prior to or concurrent with the dredging of the slip, while the berm is still in place. Land based mobile cranes with pile driving equipment would be located on the land-side of the LNG vessel berth sheet pile walls.

In addition, the loading platform above the LNG vessel berth would require thirty-two 24-inch-diameter piles. All platform piles would be installed on the land side of the berth, while the marine slip is still isolated from the bay by a berm.

Construction of the tug boat dock and floating boat house would require 98 piles. These would be driven in while the marine slip is still isolated from the bay.

Slope Armoring

The northern slip face would be armored after the slip is dredged but before the berm is removed. The south slip would remain unarmored because the berm would be removed during Phase 3 of slip construction.

Phase 3 – Salt Water Dredging for the Slip and Access Channel

Breaching and Removing the Berm

After the Fresh Water Phase of dredging the upland portion of the slip is completed, the berm separating the northern portion of the slip from the bay would be breached and removed. Dredging to remove the berm may be done from both the northern side of the slip and the bay side. In total, about 500,000 cy of material would be dredged during removal of the berm. That material would be used to rebuild the dune on the eastern side of the LNG vessel berth (area E4 on figure 2.1-2).

Final Contouring and Slope Armoring

Final contouring and armoring of the remaining slip side slopes would be completed after the berm is removed. In-water work would be performed during the ODFW's allowable construction window in Coos Bay between October 1 and February 15. The marine slip would be protected from wave action and wind erosion by the installation of stone or articulated block reinforcement. The north and east sides of the slip would be protected from the toe trench to above the waterline. Portions of the slip not expected to be subject to water or wind erosion, above about +25 feet NAVD88, would be protected by other means, including concrete cellular mattresses, grout injected geotextile fabric mattresses, and geotextile reinforced vegetative plantings.

Dredging the Access Channel

The access channel between the Jordan Cove LNG terminal proposed marine slip and the existing Coos Bay navigation channel would be dredged either before or after the berm is removed. Work in the bay south of the slip would be done during the ODFW's allowable construction window between October 1 and February 15. It is estimated that dredging of the access channel would remove about 1.3 mcy of material, which would be conveyed through the slurry pipeline to the South Dunes Power Plant area.

Restoration

Following the dredging activities, the slurry and decant water pipelines would be dismantled and removed, and all disturbed areas along the right-of-way for those lines would be restored to their previous condition and use. In addition, part of the dune on the east side of the marine slip, west of the Roseburg Forest Products tract, would be reconstructed.

2.4.1.4 LNG Vessel Berth

The open cell sheet pile structure is designed to uniformly deform into a scalloped face as the land side static loads are applied. The sheet piles, including the tie-back walls, are driven in first, then materials would be excavated from the water side. When the sheets are driven in, the wall would initially be straight. After the removal of the water side materials, the shore side load would stretch the piled walls, locking them in place.

2.4.1.5 LNG Loading Facilities

The LNG vessel loading facilities would be constructed once the eastern side of the slip is formed. All of the loading facilities would be on the shore side of the slip, with no facilities located in the water of the slip. The platform with the loading arms (inclusive of the loading and vapor return arms) would be constructed on a concrete pad located at the edge of the slip. The loading arm platform would be constructed on columns raised from the concrete pad and accessed through stairways to the ground surface. The foundation of the pad would contain a number of piles that would be tied into the concrete pad to provide a stable foundation for the breasting dolphins and the loading arm platform. Separate piles would be driven for the breasting dolphin and the loading arm platform.

The LNG vessel loading facilities would be constructed using land-based equipment to install the required structural elements for the loading platform and mooring dolphin. Actual installation of berth piping and equipment, and hookup and commissioning of the loading system and utilities would follow.

2.4.1.6 LNG Transfer Pipeline

The LNG transfer pipeline would be a 36-inch-diameter stainless steel aboveground pipeline between the LNG storage tanks and the vessel loading platform. It would be insulated, and supported on steel sleeper-style structures. Beneath the pipeline would be a 3-foot-wide reinforced concrete trench with metal grating cover.

2.4.1.7 LNG Storage, Liquefaction, and Support Facilities

Site Preparation

Construction site preparation would require clearing, filling, and grading of the site to an approximate elevation of +30 feet NAVD88 for the base of the LNG storage tank area and approximately +46 feet NAVD88 for the process areas. Temporary ditches, sediment fences, and silt traps would be installed as necessary. Individual excavations would then be made for equipment foundations. Following completion of foundations, the site would be brought up to final grade. Final grading and landscaping would consist of gravel surfaced areas, asphalt surfaced areas, concrete paved surfaces, grass areas, and construction of the storm surge barrier.

Grading the terminal process areas would entail approximately 2.5 million cy of cut and fill. Any material remaining from that work, including final grading and landscaping, would be used to raise the South Dunes Power Plant site and raise the access/utility corridor. Approximately 3.5 million cy of material would be available for the South Dunes Power Plant and access/utility corridor to raise the existing elevation to approximately +46 to +48 feet NAVD88. The material available to raise the elevation of these areas would come from the excavation and dredging of the slip and access channel.

LNG Storage Tank Construction

Construction of the LNG storage tanks would be the most time-consuming element in the development of the LNG terminal. General steps taken during construction of each LNG storage tank would include installation of the foundations and tank bottom slab, construction of the outer concrete container wall, insertion of the bottom carbon steel vapor liner, construction of the steel dome roof and suspended deck, installation of the 9 percent nickel steel inner tank, installation of the internal tank accessories (pump columns, instrumentation, and piping), installation of external tank accessories, installation of insulation, and installation of LNG pumps. Following a successful inner container hydrotest (see below), the tank would be washed down and cleaned. After installation of the LNG pumps, the tank would be closed and purged with nitrogen to a positive gauge pressure. At this point in the construction process, the tank would be ready for cooldown with LNG.

Support Facilities

Construction of foundations for buildings and installation of major mechanical equipment would occur once LNG storage tank construction is underway. Large equipment items would be set on their foundations upon delivery. After the pipe racks are completed, work would commence on the installation of the process and utility piping. The installation of mechanical equipment would be followed by electrical and instrumentation installation. Once the piping is completed and tested, piping insulation would be installed. As the construction of the process portion of the LNG terminal progresses, work would commence on the pre-commissioning activities, so that these activities would be completed concurrently with the completion of the LNG storage tanks and be ready for nitrogen purging.

2.4.1.8 South Dunes Power Plant

The location of the South Dunes Power Plant was formerly the Weyerhaeuser mill, which has been removed. Outside of some foundations and asphalt pavement, the only major aboveground structures still extant at this location includes a water tank and the PacifiCorp electric substation. The substation would be relocated. The elevation of this site would be raised to a final grade of about +46 to +48 feet, using material excavated and dredged from the Jordan Cove marine slip and access channel. Spread footings and slab on grade foundations would be used to support plant buildings and equipment.

2.4.1.9 Testing

Jordan Cove would conduct testing of the LNG storage tanks and other terminal facilities in accordance with applicable codes and requirements. The storage tanks would be tested in accordance with API 620, while piping would be tested in accordance with the ASME B31.3. Some of the tests to be carried out are described below.

Testing of the LNG Storage Tanks

The inner container of each LNG storage tank would be hydraulically tested by filling the tank with water, and then pressurizing the tank. Jordan Cove would obtain the water for the hydrostatic test of the storage tanks from three sources: the firewater pond, raw water line, and potable water line. Water withdrawn from the CBNBWB lines would be limited to 1,000 gpm to reduce stress on the lines. It would take approximately 10 days to fill one tank with the 28 million gallons necessary for testing. No biocides or chemicals would be added to the test water.

To minimize water usage, the two tanks would be hydrotested with the same water by transferring the water at the conclusion of the hydrotesting of one tank to the other tank. Due to the inability to transfer residual water from the heel of the first tank, about 0.25 million gallons of additional water would be added during the test of the second tank. Therefore, for both tanks combined, about 28.25 million gallons would be used during hydrostatic testing. Water would be introduced into the inner tank container through a manhole in the outer container's concrete roof. The duration that the water remains in the tanks would be strictly controlled; therefore, it is not expected that any contamination or discoloration would be present on discharge, even after being passed through both LNG storage tanks. However, the water would be tested to confirm composition prior to the water being transferred between each individual tank and before the water is discharged from the last tank. Jordan Cove estimated the total duration of the hydrotest of the first tank from start of filling to emptying would be approximately 34 days, with the second tank taking approximately 21 days. The CBNBWB informed Jordan Cove that the existing 12-inch-diameter main raw water line has the necessary pressure and capacity to supply 20 million gallons over 2 weeks during a low demand period (September to May), and the same quantity could be obtained during 3 weeks during the high demand period (May to September).

On completion of hydrotesting the final tank, the water would be pumped from the tank to the firewater pond. The rate of discharge is expected to be approximately 1.8 mg/d for the bulk pumping operation with substantially lower rates being achieved when removing the final amounts of water from the tank bottom. From the firewater pond, the hydrotest water would be discharged into the industrial wastewater pipeline via an overflow, which connects to a previously existing, permitted ocean discharge. Water would be sampled and tested for suitability prior to discharge. If treatment is found to be required, treatment procedures would be developed prior to discharge. Jordan Cove would retain about 5 million gallons in the firewater pond to support operation of the terminal facilities. Therefore, about 23.25 million gallons would be discharged through the industrial wastewater pipeline after the hydrostatic testing of the two LNG storage tanks.

Jordan Cove would use a pneumatic test on the outer container for each LNG storage tank. During that test, the outer container would be held at 1.25 times design pressure for one hour.

Testing of Pipework

Piping within the LNG terminal facility would be tested using hydrostatic or pneumatic methods. In general, cryogenic piping (piping that would transfer LNG) would be pneumatically tested with dry air or nitrogen at 1.1 times design pressure. Non-cryogenic piping (e.g., piping that would transfer natural gas) would be hydrotested using clean water at 1.5 times design pressure.

2.4.2 Pacific Connector Pipeline and Associated Aboveground Facilities

Construction of the proposed pipeline would primarily involve standard cross-country pipeline construction techniques as described in section 2.4.2.1. Special construction techniques would also be used when constructing the pipelines across wetlands; waterbodies; roads, railroads, and other utilities; agricultural and residential areas; and areas of rugged terrain. These special construction techniques are described in section 2.4.2.2. Construction of the aboveground facilities is discussed in section 2.4.2.3.

2.4.2.1 General Pipeline Construction Techniques

Figure 2.4-2 shows the typical steps of cross-country pipeline construction. Standard pipeline construction proceeds in the manner of an outdoor assembly line composed of specific activities that make up the linear construction sequence. These operations collectively include survey and staking of the right-of-way, clearing and grading, trenching, pipe stringing and bending, welding and coating pipe, lowering-in pipe and backfilling, hydrostatic testing, right-of-way cleanup, and restoration.

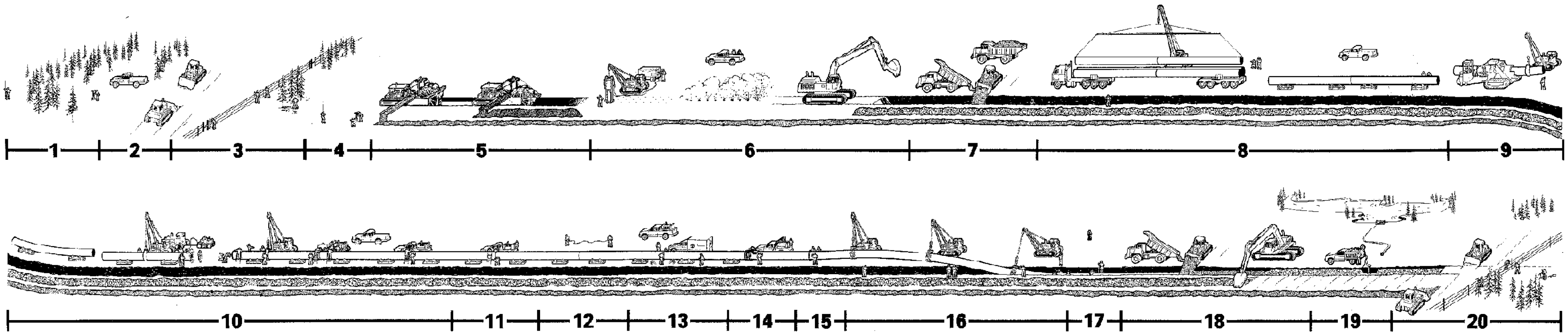
Pacific Connector has determined that to efficiently construct the pipeline, construction would be divided into at least five separate construction spreads. Each spread would consist of all construction activities necessary to construct the pipeline in the area designated for that spread.

Preliminary locations of construction spreads identified by Pacific Connector include the following:

- Spread 1 – MPs 1.5R-49.7;
- Spread 2 – MPs 49.7-94.7;
- Spread 3 – MPs 94.7-132.1;
- Spread 4 – MPs 132.1-188.0; and
- Spread 5 – MPs 188.0-228.1.

The subbasins and fifth-field watersheds directly crossed by the proposed pipeline centerline, and the associated construction spread, are listed in table 2.4.2.1-1. Five additional watersheds would be impacted by the pipeyard storage areas; however, these watersheds would not be crossed by the project's centerline. The watersheds include the Deer Creek–South Umpqua River, Gold Hill-Rogue River, Lower Cow Creek, Lower North Umpqua River, and Middle Cow Creek watersheds. Impacts to all watersheds affected by the pipeline project are assessed in section 4.4 of this EIS.

PIPELINE CONSTRUCTION SEQUENCE



LEGEND

1 - Right-of-Way Acquisition and Survey*
2 - Clearing and Grading
3 - Fencing
4 - Centerline Survey of Ditch*

*Owner's Responsibility

5 - Ditching (Rock-Free)
6 - Ditching (Rock)
7 - Padding Ditch Bottom
8 - Stringing

9 - Bending
10 - Line Up, Stringer Bead and Hot Pass
11 - Fill and Cap Weld
12 - As-Built Footage*

13 - X-Ray* and Weld Repair
14 - Coating Field and Factory Welds
15 - Inspection (Jeeping) and Repair of Coating
16 - Lowering In and Tie-Ins

17 - As-Built Survey*
18 - Pad and Backfill
19 - Test and Final Tie-In
20 - Replace Topsoil and Cleanup

Figure 2.4-2
Typical Pipeline Construction Sequence

TABLE 2.4.2.1-1

Subbasins and Fifth-Field Watershed Crossed by the Pacific Connector Pipeline Project

	Fifth Field Watershed			
Subbasin	**Name**	**HUC**	**Miles Crossed**	**Construction Spread**
Coos	Coos Bay-Frontal Pacific Ocean	1710030403	20.4	1
Coquille	Coquille (Middle Main) River	1710030505	2.0	1
	North Fork Coquille River	1710030504	8.4	1
	East Fork Coquille River	1710030503	10.2	1
	Middle Fork Coquille River	1710030501	15.5	1,2
South Umpqua	Olalla Creek-Lookingglass Creek	1710030212	8.9	2
	Clark Branch–South Umpqua River	1710030211	13.3	2
	Myrtle Creek	1710030210	8.7	2
	Days Creek–South Umpqua River	1710030205	19.7	2,3
	Elk Creek	1710030204	3.4	3
	Upper Cow Creek	1710030206	5.2	3
Upper Rogue	Trail Creek	1710030706	10.6	3
	Shady Cove–Rogue River	1710030707	8.1	3
	Big Butte Creek	1710030704	5.0	3,4
	Little Butte Creek	1710030708	32.9	4
Upper Klamath	Spencer Creek	1801020601	15.1	4
	John C. Boyle Reservoir–Klamath River	1801020602 a/	5.4	4
Lost River	Lake Ewauna–Upper Klamath River	1801020412	16.4	5
	Mills Creek–Lost River	1801020409	22.5	5
Total b/			**231.8**	

Note: Miles are rounded to the nearest tenth of a mile. Column may not sum correctly due to rounding.
a/ There are no waterbodies crossed in the Klamath River-John C. Boyle Reservoir Fifth Field Watershed.
b/ Five additional watersheds would be affected by the pipeline project (e.g., access road), but not directly crossed by the centerline: Deer Creek–South Umpqua River, Gold Hill–Rogue River, Lower Cow Creek, Lower North Umpqua River, and Middle Cow Creek watersheds.

Surveying and Staking

Prior to the start of construction, the exterior limits of the approved construction right-of-way and boundaries of TEWAs would be civil surveyed and clearly staked and signed. Civil survey is generally performed on foot or using all-terrain vehicles (ATV) or off-highway vehicles (OHV) from existing access points to the pipeline right-of-way. All work would be performed by professional land surveyors licensed in the State of Oregon and which hold a valid and current Certified Federal Surveyor certificate.

The survey stakes would be maintained throughout construction, and monitored by Pacific Connector's environmental inspectors (EI). Any pre-existing property line or survey monuments that occur within the construction right-of-way would be protected where possible, and if damage occurs during construction, these monuments would be replaced according to state and federal standards. Civil surveys on federal lands would adhere to guidelines established by the BLM, Forest Service, and Reclamation that were provided to Pacific Connector during the pre-filing review period. Pacific Connector produced a *Right-of-Way Marking Plan*, included as Attachment 21 of its POD.

Fences would not be used to mark the right-of-way; however, some fencing may be used as requested or approved by landowners to reduce damage to property and resources (e.g., to prevent unauthorized access by OHVs). The limits of the right-of-way and TEWAs would be marked by wooden stakes and flagging. Approved access roads would be signed. Also signed would be sensitive environmental areas that would be off-limits to construction crews.

Access to the Construction Right-of-Way

Roads that would be used for access to the right-of-way during construction are more fully discussed in section 4.10 (Transportation) of this EIS. There are three types of roads that would be utilized for this Project: 1) existing roads; 2) new TARs; and 3) new PARs.

Equipment involved in pipeline construction would be moved onto the right-of-way using approved access roads, and would then generally proceed down the right-of-way performing their job tasks. Part of the construction right-of-way would include a travel lane for construction equipment and related Project vehicles, accommodated within the standard 95-foot-wide construction right-of-way. Pacific Connector would place mats over wetland and bridges over waterbodies along the travel lane, in accordance with the FERC's *Plan* and *Procedures*, including modifications, and install temporary erosion control devices in accordance with its ERCP. After the pipeline is installed, the right-of-way would be restored and revegetated, including the removal of the travel lane and TARs.

Typical pipeline construction equipment that would travel down the right-of-way include pipe trucks, flat-bed trucks, mowers, bulldozers, graders, front-end loaders, backhoes, trenching machines, bending machines, side-booms, welding machines, fork lifts, rock hammer machines, padding machines, winch trucks, water trucks, dump trucks, pick-up trucks, and other miscellaneous equipment. A list of typical pipeline construction equipment and noise levels can be found in table 4.12.2.4-5 in section 4.12, Air Quality and Noise. Pacific Connector has produced a TMP for federal lands as Attachment 25 of its POD, and included a TMP for non-federal lands as Appendix 8H in Resource Report 8 of its June 2013 application to the FERC.

Clearing and Grading

The construction right-of-way and TEWAs would be cleared of brush and trees. Pacific Connector has produced a *Right-of-Way Clearing Plan for Federal Lands* as Attachment 20 of its POD. The general clearing procedures outlined in that plan would also apply to non-federal lands. During clearing operations, existing fences crossed by the pipeline route would be cut and braced, and temporary gates installed to control livestock and limit public access to the right-of-way. Temporary erosion control devices would be installed at the end of clearing activities. Details about erosion control devices can be found in Pacific Connector's project-specific ECRP, in the FERC's *Plan*, and the POD. Erosion control is more fully discussed in section 4.3.1.3 of this EIS.

Hayfields, pastures, and grassy areas would not be cleared except in areas directly over the trench or where grading would be required to create a level working surface. Tall shrubs, such as sagebrush, would be mowed or scalped off with a motor-grader or a bulldozer. Cleared grasses and brush would be stockpiled along the edge of the right-of-way or within TEWAs or UCSAs, then mulched and spread back over disturbed areas during final cleanup and restoration.

In forested areas, timber would be cut and cleared from the right-of-way and TEWAs using standard logging techniques, in accordance with landowner requirements including time-of-year restrictions. Merchantable timber would be removed and/or sold according to landowner stipulations. Pacific Connector indicated that specific logging methods may not be fully determined until a contractor has been selected for construction of its pipeline. In general, ground-based skidding and cable (where feasible) logging methods would likely be the standard method; however, in some isolated rugged topographic areas with poor access, helicopter logging may be used. Impacts on timber are more fully discussed in section 4.5.2 of this EIS.

Following clearing, the right-of-way would be graded where necessary to create a reasonably level working surface to allow safe passage of construction equipment and materials. During grading activities, topsoils would be separated from subsoils, and each would be stored in segregated piles within the construction right-of-way and TEWAs. The FERC's *Plan* requires topsoil segregation in residential areas, crop lands, pastures and hayfields, and in other areas as required by the landowner. The topsoil should be stripped either across the entire construction right-of-way, or over the trench line and soil storage areas. In wetlands, the FERC's *Procedures* require that the top foot of soil over the trench line be salvaged, except in areas of standing water or saturated soils. Where topsoil would be segregated on non-federal lands, Pacific Connector has requested 10 additional feet of TEWA in addition to its nominal 95-foot-wide construction right-of-way in uplands.

The BLM has stipulated that topsoil should be salvaged where the pipeline route would cross BLM lands. However, Pacific Connector has requested a modification from the FERC's *Plan*, and does not want to segregate topsoil on BLM lands to avoid additional TEWAs in LSRs. This issue is further discussed under section 4.3.2.1.

Trenching

A rotary trenching machine, rock trencher, track-mounted backhoe, or similar equipment would be used to excavate a trench for the pipeline. Spoil excavated during trenching would be temporarily stockpiled to one side of the right-of-way adjacent to the trench.

The depth of the trench would vary according to site-specific conditions. According to the DOT requirements in 49 CFR 192.327, the minimum depth of cover for a buried natural gas transportation pipeline must be:

- 30 inches in normal soil and 18 inches in consolidated (solid) rock for Class 1 locations; and
- 36 inches in normal soil and 24 inches in consolidated rock for Class 2, 3, and 4 locations, and under drainage ditches, public roads, and railroad crossings.

Pacific Connector intends to exceed DOT requirements where possible, and bury its pipeline up to 36 inches deep in Class 1 areas with normal soils and 24 inches deep in Class 1 areas with consolidated rock. The trench may be deeper at stream crossings with scour concerns, or areas with geological hazards. Pacific Connector committed to burying the pipeline below the estimated 100-year scour depth or into competent bedrock, whichever is shallower. Pacific Connector's geological consultant estimated depth to bedrock at the crossing of Middle (Park) Creek to be about 7 feet, and about 9 feet at the eastern crossing of the South Umpqua River. At South Fork Elk Creek, Olalla Creek, and North Myrtle Creek, 100-year scour depths were estimated between 6 and 11 feet.

In areas where bedrock is found close to the surface within the proposed trench depth, Pacific Connector would first attempt to dig the trench with specialized equipment, such as rock saws, or ripping using hydraulic hammers. However, if these methods are ineffective, blasting may be necessary to achieve the required trench depth. Pacific Connector prepared a *Geologic Hazards and Mineral Resources Report*, filed as part of its application to the FERC, which classifies blasting potential along the route based on existing soil and bedrock data. Blasting potential was classified as high for about 100 miles of the proposed pipeline route. All blasting would be done by licensed contractors under the terms of applicable regulatory requirements. Pacific Connector produced a *Blasting Plan* as Attachment 3 of its POD. Blasting is further discussed in section 4.2.2 of this EIS.

Stringing, Bending, and Welding

After trenching, pipe sections would be trucked to the right-of-way, and strung along the route, using side-booms to unload the joints from the flatbed trucks. A hydraulic bending machine would bend some pipe joints to fit the contour of the trench bottom (where there are changes in the natural ground contours or where the pipeline changes direction). In other situations, pipe sections would be factory bent, or special pre-fabricated pieces would be used.

The pipe joints would be welded together by a separate trained crew of welders, and placed on wooden skids adjacent to the trench. All welds would be visually inspected, nondestructively tested (using radiographic or equivalent methods), and repaired, if necessary. Line pipe, normally mill-coated prior to stringing, would require field applied coating at the welded joints prior to final inspection. The entire pipeline coating would be inspected and tested to locate and repair any flaws or voids.

Lowering-in and Backfilling

After welding and coating are completed, the pipe would be lowered into the trench by side-boom tractors and excavators. Before lowering the pipe, the trench would be inspected to ensure that it is free of rocks and other debris that could damage the pipe or the coating. In addition, the pipe and trench would be inspected to ensure that the configurations of the pipe and trench configurations are compatible. Padding, sometimes sandbags, would be placed at the bottom of the trench, with the pipe put on top of the padding.

To prevent water from the trench from entering wetlands or waterbodies, Pacific Connector would install permanent trench plugs, consisting of sandbags, foam, or bentonite, at the base of slopes adjacent to wetlands and waterbodies, in accordance with its ECRP, and consistent with the requirements of the FERC's *Plan*. In accordance with the FERC's *Procedures*, the trench would be dewatered in a manner that does not cause erosion and does not allow silt-laden water to flow into any adjacent wetland or waterbody.

Bladed equipment or a backfilling machine would be used to backfill the trench. No foreign substance, including skids, welding rods, containers, brush, trees, or refuse of any kind, would be permitted in the backfill. Segregated topsoil, where applicable, would be replaced after backfilling the trench with subsoil. Following backfilling, a small crown of material would be left to account for any future soil settling that might occur.

Hydrostatic Testing

After backfilling, the pipeline would be hydrostatically tested in accordance with DOT regulations to ensure that is capable of operating at the MAOP. During the test, sections of the pipeline would be filled with water and pressurized to 550 psig. Should a leak or break occur during testing, the line would be repaired and retested until the specifications are achieved. Pacific Connector produced a *Hydrostatic Testing Plan* as Attachment 13 of its POD.

The pipeline would be tested in approximately 75 sections, each with varying lengths and water volume requirements. Approximately 62 million gallons of water would be required to test the pipeline. Water for hydrostatic testing would be obtained from commercial or municipal sources or from surface water right owners. If water for hydrostatic testing is acquired from surface water sources, Pacific Connector would obtain all necessary appropriations and withdrawal permits prior to construction, including permits through the Oregon Water Resources Department (OWRD). As part of this process, OWRD would have the applications reviewed by ODEQ and ODFW to determine if there are concerns about the impact water withdrawals may have on water quality, and fish and wildlife and their habitats. Pacific Connector would negotiate water appropriations with private owners in the year prior to construction.

Pumps used to withdraw surface water would be screened according to ODFW and NMFS standards to prevent entrainment of aquatic species. In addition, Pacific Connector included BMPs in its *Hydrostatic Testing Plan* to avoid the potential spread of aquatic invasive species and pathogens of concern. BMPs were developed in consultation with the BLM, Forest Service, Reclamation, and the Center for Lakes and Reservoirs and Aquatic Bioinvasion Research and Policy Institute.

Permission to discharge the hydrostatic test water would be applied for concurrently with the request for coverage under the ODEQ General Stormwater Discharge Permit and permitted through a separate letter of approval. Hydrostatic test water would be discharged in upland settings, into erosion control devises, to minimize the potential for scour, erosion, and sedimentation into nearby wetlands and waterbodies, in accordance with Pacific Connector's ECRP and the POD. Straw bale barriers and silt fence would typically be used to retain sediment and reduce velocity. Additional discussion of hydrostatic testing discharges can be found in section 4.4.2 of this EIS.

Dust Control

Fugitive dust may be created by pipeline construction activities. To control dust, Pacific Connector would use water trucks to spray the right-of-way. Water for dust control purposes would be obtained from commercial or municipal sources, and all appropriate approvals and/or permits would need to be obtained prior to withdrawal. Pacific Connector produced an *Air, Noise, and Fugitive Dust Control Plan* as Attachment 2 to its POD. The amount and sources of water for dust control are discussed in section 4.4.2 of this EIS. Section 4.12.1.2 discusses impacts and mitigation measures to reduce fugitive dust.

Cleanup and Permanent Erosion Control Devices

After the pipeline is installed in the trench and backfilled, Pacific Connector would complete final grading, returning the right-of-way to its previous contours. Drain tiles crossed by the pipeline would be checked, and if damaged, they would be repaired before backfilling. During final cleanup and initial restoration, fences, gates, drainage ditches, culverts, and other structures that may have been temporarily removed or damaged during construction would be permanently repaired, returned to their pre-construction condition, or replaced. All construction debris, including excess rock, would be removed from the right-of-way and placed in authorized disposal locations. On federal lands, site-specific crossing restoration plans would be implemented for perennial stream crossings (e.g., Middle Creek, East Fork Cow Creek). Streambanks would be stabilized, and permanent erosion control devices would be installed. The right-of-way would be mulched, seeded, and revegetated in accordance with Pacific Connector's ECRP.

Pacific Connector would install permanent erosion control devices consistent with the requirements of Section V.B. of FERC's *Plan* and as described in its ECRP. The permanent erosion control measures include trench breakers, slope breakers, and revegetation to stabilize disturbed areas. Pacific Connector would consult with the BLM, Forest Service, and Reclamation regarding the installation of permanent erosion control structures on federal lands, and with the NRCS regarding such structures on non-federal lands. The permanent erosion control measures developed by Pacific Connector in its ECRP are generalized to be consistent with different agency requirements based on slope and soil types crossed by the proposed pipeline. Table 2.4.2.1-2 lists specifics from Pacific Connector's ECRP for the installation of slope breakers.

TABLE 2.4.2.1-2

Permanent Slope Breaker Spacing From Pacific Connector's ECRP a/

Slope	Highly Erosive Granitic Soils b/	Soils With Moderate or Low Potential for Erosion
0 to 5 percent	None required	None required
5 to 15 percent	100 feet	200 to 300 feet
15 to 30 percent	50 to 75 feet	75 to 100 feet
Greater than 30 percent	50 feet	50 feet

a/ Actual spacing would be determined at the time of installation based on site-specific topographic conditions on the right-of-way to ensure proper slope breaker construction and proper drainage to stable off-site areas. On the Umpqua National Forest between about MPs 109 and 110, where the alignment would cross the historic Thomason cinnabar claim group, waterbars would be installed at 50-foot intervals as recommended by the Forest Service.
b/ Granitic formations would be crossed by the pipeline between: MPs 79.1 to 80.5; MPs 81.6 to 82.2; MPs 87 to 88.8; MPs 97 to 101.2; MPs 103 to 105.4; and MPs 114.8 to 115.

Revegetation

All areas disturbed by construction, including the construction right-of-way, TEWAs, UCSAs, and contractor yards as necessary, would be restored and revegetated in accordance with Pacific Connector's ECRP. The right-of-way would be regraded and topographic contours and drainage patterns returned to as close as preconstruction conditions as possible. Erosion control fabric would be used on streambanks.

Segregated topsoil would be spread over the right-of-way where it was salvaged. A seedbed would be established to a depth of up to four inches where necessary. In most areas, typical regrading and contouring would create a suitable rough, yet firm, seedbed, conducive to capturing seeds when broadcast and retaining soil moisture. Consistent with the FERC's *Plan*, if final grading occurs more than 20 days after pipe installation and backfilling, Pacific Connector would apply mulch on all disturbed areas prior to seeding.

Based on Oregon State University Extension Service recommendations for fertilization rates for nitrogen fertilizer on new pasture seedlings, Pacific Connector intends to use a standard fertilization rate of 200 pounds per acre bulk triple-16 fertilizer on disturbed areas to be seeded. The NRCS did not recommend the addition of lime or other soil pH modifiers. Fertilizer would not be used in wetlands, unless required by the land-managing agencies, and would not be applied within at least 100 feet of streams. The fertilizer would be stored outside of riparian reserves and away from streams, and would not be applied during heavy rains or high wind conditions. It could be either broadcast, or incorporated in the slurry for hydroseeding.

It is expected that seeding would be timed to begin in August and could extend into the winter months at lower elevations. Disturbed areas would be seeded within six working days of final grading, weather and soil conditions permitting. Seeding may be done by broadcast methods, drilling, or hydroseeding. Broadcast seeding, using a mechanical broadcaster seeder, is the preferred method of seeding on steep slopes. After broadcast, the seedbed would be lightly dragged by chains or other appropriate harrows to cover the seeds thinly with soil. Hydroseeding would be done in accessible upland areas. Hydroseeding equipment would include tanks, pumps, nozzles, and other devises for mixing the seed hydraulically with wood fiber mulch and tackifier. A built-in agitator would keep the seed, mulch, tackifier, and water mixed together homogeneously until pumped from the tank. A drill seeder pulled by a plow may be used as an alternative to broadcast seeding in gently sloping areas.

Seed mixtures were determined in consultations with land-managing agencies and the NRCS. The seed mixtures were listed in Pacific Connector's ECRP, and are further discussed in section 4.5.1 of this EIS. There are special seed mixes for areas that contain federally-listed threatened or endangered plant species, including Kincaid's lupine, Applegate's milk-vetch, Gentner's fritillary, and Cox's mariposa lily; those seed mixes were listed in Pacific Connector's *Federally-Listed Plant Conservation Plan* (Attachment 10 of the POD). Seeding rates are based on Pure Live Seed.[12] The seed mixture should be free of noxious weeds. During right-of-way easement negotiations, private landowners may select their own seed mixtures other than those proposed for elsewhere along the pipeline route. The seed mixtures on BLM land were developed based on BLM Instruction Memo-2001-014, which specifies the use of native species, if possible. Pacific Connector's ECRP stated that native seeds would be collected during a two-year period prior to construction, and local vendors have indicated they could supply the necessary seeds during that period. The POD has additional requirements for revegetation on federal lands.

Mulch would be applied on slopes were necessary to stabilize the right-of-way after seeding. Mulch would consist of native wood, straw, or hydromulch, and certified weed-free straw. It is anticipated that native wood mulch and manufactured wood fiber mulch would be the major sources of mulch applied. In non-forested areas, straw mulch would be spread at 2 tons/acre, except on slopes within 100 feet of waterbodies and wetlands where application rates would be increased to 3 tons/acre. During hydroseeding, manufactured wood fiber mulch would be applied at 2,000 pounds per acre. On slopes greater than 2.5 to 1 (i.e., 40 percent grade), Pacific

[12] In addition to the live seed from the desired plant species, bulk seed contains dust, chaff, and dead seed, and may contain seeds from other plant species. Pure Live Seed refers to the amount of live seed of the desired species in a lot of bulk seed.

Connector would use a bonded fiber matrix for mulch. In forested areas, native wood mulch would consist of slash, brush, chips, and non-merchantable timber cleared from the right-of-way and stored in TEWAs and UCSAs. The BLM and Forest Service have established ground cover standards and fuel loading requirements that are further discussed in section 4.5.1 of this EIS.

In forested lands, Pacific Connector would replant vegetation according to state and federal reforestation requirements. Reforestation efforts would occur in the first winter/spring (between December and April) after the pipeline is installed. Trees would be replanted across the construction right-of-way up to 15 feet from either side of the pipeline centerline. In riparian areas, shrubs and trees would be replanted across the right-of-way for a width of 25 feet from the waterbody bank. Within Riparian Reserves, Pacific Connector would replant shrubs and trees to within 100 feet of the ordinary high water mark (OHWM). A list of species to be replanted was included in Pacific Connector's ECRP, and revegetation is further discussed in section 4.5.1 of this EIS.

2.4.2.2 Special Pipeline Construction Techniques

Construction in rugged topography; across wetlands and waterbodies; through agricultural, residential, commercial, and industrial areas; at road and railroad crossings, and across foreign pipelines and other utilities may require special construction techniques. Special techniques would also be used if blasting is required. These techniques are described below.

Rugged Topography

The Pacific Connector pipeline route would cross several mountain ranges, with steep and rugged topography. Through those mountains, the pipeline route would utilize ridgelines, where feasible, to minimize the amount of cut and fill, and to avoid steep slopes, geologic hazards, and waterbody crossings, and to reduce erosion potential. In areas of steep slopes, two-tone construction techniques may be necessary, creating two step-wise level surfaces within the construction right-of-way (see Drawing #3430.34-X-0019 in Attachment C of Pacific Connector's ECRP, included with Resource Report 1). In addition, Pacific Connector's *Geological Hazards and Mineral Resources Report* identified geological hazards along the pipeline route. Site-specific mitigation measures for the crossing of some of these hazards are discussed in more detail in section 4.2.2.

During construction through rugged topography, Pacific Connector would consider the following factors :

- design adequate construction work spaces;
- provide a safe working grade;
- utilize appropriate construction techniques for site-specific situations;
- construct during the dry season as much as possible;
- install temporary erosion control devices during construction;
- install trench breakers, as appropriate, on slopes and near waterbody and road crossings;
- backfill the trench immediately after pipe installation;
- install permanent erosion controls soon after completing rough grading; and
- revegetate slopes with quick germinating seed mixtures.

Additionally, Pacific Connector's ECRP outlines procedures for fill on slopes exceeding a gradient of 3H:1V, including fill materials, slope preparation, and fill placement and compaction. The POD includes additional factors that would be considered on federal lands.

Waterbody Crossings

Construction of the proposed Pacific Connector pipeline would affect 400 waterbodies (including ditches). Waterbodies would be crossed in accordance with the FERC's *Procedures* and applicable permits or approvals from other agencies. Pacific Connector filed a *Wetland and Waterbody Crossing Plan* as Attachment 28 of its POD. Crossings of perennial streams on BLM and NFS lands would be subject to site-specific plans that include construction restoration and monitoring requirements to ensure consistency with the Aquatic Conservation Strategy (ACS). A more detailed discussion of impacts on waterbodies is provided in section 4.4.2 of this EIS.

TEWAs would be located more than 50 feet away from the edge of waterbodies where possible, and Pacific Connector has identified locations where site-specific conditions or other constraints prevent a 50-foot setback. Hazardous materials, chemicals, fuels, and oils would be stored at least 100 feet from the edge of waterbodies and wetlands (150 feet on federal lands).

Construction equipment would cross waterbodies on temporary bridges. The bridges would be designed to span the entire OHWM of the waterbody. Soil would not be used to stabilize bridges. On NFS and BLM lands, all streams, whether wet or dry, would be crossed with (1) a bridge, (2) a temporary culvert, or (3) a low water ford with a rock mat.

Pipeline crossings of perennial waterbodies would be made perpendicular to the axis of the waterbody channel, where feasible. The pipeline route would avoid paralleling a waterbody within 15 feet or less, where feasible.

Waterbodies that are classified as coldwater fisheries would be crossed during the in-water work window recommended by the ODFW and as determined through subsequent FWS/NMFS Section 7 ESA consultation. Pacific Connector would attempt to cross intermittent flowing streams, and irrigation canals and ditches when they are dry, using standard upland, cross-country pipeline construction methods. The standard depth of cover would be 5 feet below intermittent flowing streams and ditches.

Pacific Connector would use the following methods to cross flowing streams: wet open cut, diverted open cut, dry open cut, convention boring, DP technique, and HDD. These are briefly described below.

<u>Wet Open Cut</u>

Pacific Connector proposes to use wet open cut pipeline construction methods within the Coos Bay estuary, from about MPs 1.7R to 4.1R. The plan for crossing Haynes Inlet was included with the JPA stand-alone document filed with Pacific Connector's application to the FERC (JPA-9). Water depth along this route is shallow, varying from 3 to 10 feet. During ebb tide, marsh excavators with tracks around pontoons would dig the pre-lay trench. A bucket dredge may be used where greater water depth allow. The spoil would be set aside next to the trench, and turbidity curtains may be deployed. Concrete coated pipe would be placed on lay barges, from which 40-foot-long joints would be installed in the trench by the push-pull method.

Welding would occur on the barges. Backfilling would allow for 5 feet of cover over the pipe. Construction in Coos Bay would occur between October 1 and February 15.

Diverted Open Cut Crossing

Pacific Connector would use a diverted open cut for the eastern crossing of the South Umpqua River at about MP 94.7, because the river is too wide for a typical dry crossing using either dam and pump or flume methods, and geotechnical studies indicated that subsurface conditions are not suitable for an HDD or conventional boring. At MP 94.7, the South Umpqua River channel is sufficiently flat, wide (175 feet bank to bank), and shallow (varying from a few inches to 15 feet deep), with flow slow enough to allow water to be diverted to one side while work is conducted on the opposite bank. A site-specific plan for the eastern crossing of the South Umpqua River at MP 94.7 was included in Appendix 2E of Resource Report 2 of Pacific Connector's application to the FERC.

A temporary diversion structure, comprised of porta dams, aqua dams, steel plates, plastic sheeting, sandbags, or similar devices would be placed in the river upstream of the crossing. It may be necessary for equipment to work in the river to install the diversion structure. Once the work area is isolated, fish would be salvaged by an ODFW-approved biological contractor, and the area dewatered using discharge pumps. The trench would be excavated and spoil stored adjacent; behind the diversion structure or other sediment control devices. Bedrock may be encountered between 0.7 and 8.7 feet below the channel floor, and the top of the pipe would be buried at least 24 inches below the top of bedrock. The pipe string would be installed in the trench and backfilled. A bell hole would be left open at the end of the first section to allow a tie-in to the second section. After the installation of the first section of pipe, the diversion structure would be moved to the opposite side of the river. Water would be diverted to the first section, while the second section would be installed. The crossing would be completed over a 14-day period between July 1 and August 31, which coincides with both the ODFW preferred in-water work window and the lowest season groundwater levels.

Dry Open Cut

Flume

The flume method would be used to cross streams less than 100 feet across. Water would be diverted across the work area through one or more flume pipes. No equipment would be placed in the stream, with flumes installed by hand or using equipment from the upland banks. Sandbag and plastic sheeting would be used to support and seal the ends of the flume and to direct stream flow into the flume and over the construction area. Temporary dams at both the upstream (inlet) and downstream (outlet) sections of the flume would create a containment area in between where turbid water would be confined. After fish are salvaged from the confined area between the dams, water would be pumped out, through an upland dewatering structure, to create a dry work area for pipeline installation. Spoil from trenching would be stored in TEWAs located at least 10 feet away from the stream banks; with piles surrounded by silt fence. All in-stream work (trenching, pipeline installation, and backfilling) would be conducted while the flume is in place, and the flume would be removed immediately after backfilling and bottom recontouring is completed. Appropriate-sized gravel would be placed in the streambed, and stream banks would be re-established to pre-construction conditions, and stabilized using the erosion control measures outlined in Pacific Connector's ECRP or those outlined in site-specific plans for perennial crossings on BLM and NFS lands. Details about stream fluming procedures were attached as Appendix 2C in Resource Report 2 of Pacific Connector's application to the FERC.

Dam and Pump

The dam-and-pump method is an alternative dry construction technique that can be used to cross small or intermediate width waterbodies that are classified as coldwater fisheries. This method is preferred where the stream bottom is bedrock, and blasting may be necessary during trench excavation. Two temporary in-stream dams would be installed, with sandbags with plastic liner or other structures such as steel plates or water bladders. Stream flow would be diverted around the work area by pumping water through hoses. Intakes would be screened to prevent the entrainment of aquatic species. An energy-dissipation device would be used to prevent scouring of the streambed at the discharge location. The area between the dams would be dewatered, and the trench then excavated by trackhoes or draglines. Spoil would be stored in TEWAs located at least 10 feet from the banks; surrounded by silt fence. After pipeline installation and backfilling, the dams would be removed and stream banks restored and stabilized. Pacific Connector would cross streams using the dam and pump method during the ODFW recommended in-water work windows. Details about dam and pump procedures were attached as Appendix 2D in Resource Report 2 of Pacific Connector's application to the FERC.

Conventional Boring

Pacific Connector intends to cross three waterbodies (Kentuck Slough at MP 6.3, Catching Slough at MP 11.1, and Medford Aqueduct at MP 133.4) using conventional bore methods. There are different kinds of boring methods, including jack and bore, slick bore, and hammer bore. The type of method to be used at these specific locations has not yet been determined by Pacific Connector. During a standard boring operation, pits are excavated on both ends, with spoil from the bore passed into the pit and removed by trackhoe. The walls of the bore pits may have to be supported by trench boxes or metal sheet piling. If groundwater seeps in to the bore or bore pits, a dewatering system would need to be used. Pipe would be welded in the pit, and passed through the bore hole.

Horizontal Directional Drilling

Pacific Connector proposes to cross three major waterbodies (Coos River, MP 11.1R; Rogue River, MP 122.7; and Klamath River, MP 199.4) using the HDD construction method. This technique involves drilling a pilot hole, then enlarging that hole through successive reaming. High pressure drilling fluids, usually consisting of a slurry made of bentonite clay mixed with water would be jetted at the drill head to advance the hole. Pipe sections long enough to span the entire crossing would be staged and welded along the construction work area on the opposite side of the waterbody, hydrostatically tested, and then pulled through the drilled hole. The right-of-way between the entry and exit hole of an HDD would generally not need to be cleared or graded, except for the area of the guide wires, and direct impacts on the waterbody, adjacent riparian vegetation, and associated aquatic resources would be avoided through an HDD.

Pacific Connector included an HDD Feasibility Analysis in Appendix 2G of Resource Report 2 in its application to the FERC. That study showed that the HDD under the Coos River would be about 1,602 feet long with a maximum depth of -65 feet; while the HDD under the Rogue River would be about 3,050 feet long with a maximum depth of -76 feet; and the HDD under the Klamath River would be about 2,309 feet long with a maximum depth of -71 feet. In case of an

HDD failure, or the unanticipated release of drilling mud, Pacific Connector prepared a contingency plan attached as Appendix 2H to Resource Report 2 of its application to the FERC.

Direct Pipe Technology

Direct pipe (DP) technology is a trenchless construction method that can be used to install pipelines underneath rivers or roads without surface impacts. It is a combination of a micro-tunneling process and HDD. DPs are completed using an articulated, steerable micro-tunnel boring machine (MTBM) mounted on the leading end of the product pipe or casing which is jacked into position with a pipe thrusting machine mounted at or near the ground surface. Soil and rock are excavated by the cutting head on the MTBM and removed through pressurized slurry pipes to the launching pit. Bentonite slurry is used to increase lubrication and advance the MTBM. Overcutting is employed to create a space between the pipe and the soil. The pipeline is pre-fabricated and welded in sections to the back of subsequent sections as the MTBM advances.

Pacific Connector proposes to use DP technology to install its pipeline under the western crossing of the South Umpqua River at about MP 71.3 and the associated crossings under I-5, Dole Road, and the Central Oregon & Pacific Railroad. This DP crossing would be about 1,680 feet long, with a maximum depth of -90 feet. Pacific Connector attached its I-5/South Umpqua River Direct Pipe Feasibility Evaluation as Appendix 2I to Resource Report 2 of its application to the FERC.

Wetland Crossings

The proposed pipeline route and associated facilities and construction areas would cross about 11.6 miles of wetlands. Pacific Connector would construct its pipeline across wetlands in accordance with the FERC's *Procedures*. In general, the construction right-of-way through wetlands would be limited to 75 feet or less, where possible. TEWAs would be located at least 50 feet away from wetlands, except where topographic constraints prevent this. Grading and stump removal in wetlands would only occur over the trench. Silt fence and straw bales would be installed at the edges of the construction right-of-way through wetlands. Trench plugs would be put in where the pipeline enters and exits wetlands.

In saturated wetlands, Pacific Connector may use low ground weight equipment operating off of pre-fabricated wooden mats. It may not be possible to segregate topsoil under saturated conditions. Pipe stringing in saturated wetlands may be done next to the trench or in adjacent TEWAs. If the wetland is flooded, Pacific Connector may us "push-pull" or "float" techniques. Pipeline installation through wetlands is further discussed in section 4.4.2.3 of this EIS.

Agricultural and Residential Areas

Pacific Connector estimated that the pipeline would cross about 38.8 miles of agricultural land, and 0.4 mile of residential land. The FERC's *Plan* requires topsoil segregation in all residential areas, annually cultivated or rotated agricultural lands, pasture, and hayfields, or where requested by landowners. In these areas, topsoil should be stripped and segregated from either the full construction right-of-way, or over the trench line and subsoil storage area. Pacific Connector identified about 120 places where it intends to salvage and segregate topsoil along the pipeline route (see table D-4 in appendix D). Along the alignment where topsoil segregation is proposed, Pacific Connector has requested 10 feet of TEWA in addition to the 95-foot construction right-of-way, to stockpile segregated soils.

Another requirement of the FERC's *Plan* is that excess rock should be removed from at least the top foot of soil in all actively cultivated or rotated cropland, pasture, hayfields, and agricultural lands. Pacific Connector would use rock pickers where necessary to remove excess rocks from these areas during cleanup. Rocks would be removed consistent with the size, density, and distribution found in areas adjacent to the right-of-way. Excess rocks would be distributed along the construction right-of-way or disposed of in existing rock quarries and permanent disposal sites. Appendix 8A, Table 8A-4 in Resource Report 8 filed in June 2013 by Pacific Connector lists rock source and permanent disposal sites. Pacific Connector also attached an *Overburden and Excess Material Disposal Plan* as Attachment 17 to its POD. Some excess rocks may be used to create OHV barriers or special habitat features.

The FERC's *Plan* requires that soils in agricultural and residential areas be tested for compaction after construction, and any compaction should be alleviated. According to Pacific Connector's ECRP, during restoration activities soil compaction would be relieved by regrading and scarifying. This may include ripping and chisel plowing up to 18 inches deep.

Pacific Connector would work with individual landowners in agricultural areas to determine how the right-of-way would be restored where the pipeline would cross cropland, orchards, nurseries, or vineyards. Usually, in agricultural areas, the landowner determines whether or not Pacific Connector would be responsible for seeding. In some situations, the owner of agricultural land may do the final restoration and seeding and Pacific Connector would compensate the landowner for those efforts. In residential areas, Pacific Connector would restore disturbed lawns, ornamental shrubs, gardens, and other landscape features in accordance with their agreement with the landowner. The restoration work in residential areas would be done by a contractor familiar with local horticultural or landscape practices, or Pacific Connector may choose to compensate a landowner to restore their property.

Pacific Connector has developed site-specific construction mitigation plans for the seven residences within 50 feet of work areas. Some of the typical measures to be taken in residential areas include notification of landowners, limiting hours of construction, dust control, maintaining access, fencing, reducing the width of the right-of-way to increase the buffer to the pipeline, and replacing landscaping (see section 4.1.2.3).

Road, Railroad, and Utility Crossings

The proposed route of the Pacific Connector pipeline would include about 708 road crossings and 4 railroad crossings. Conventional bores are typically used to cross under railroads. Roads would either be bored or open cut. At least 5 feet of cover would be maintained over pipeline crossings of paved county, city, and state roads, as well as railroad crossings.

Pacific Connector would obtain all necessary permits from applicable county, state, or federal land-managing agencies for public roads to be crossed, and permission to cross private roads from the landowners. Pacific Connector produced a TMP for federal lands as Attachment 25 to the POD, and a TMP for non-federal lands was attached as Appendix 8H in Resource Report 8 of Pacific Connector's application to the FERC. Transportation management is discussed in more detail in section 4.10 of this EIS.

Pacific Connector would endeavor to notify agencies and private landowners at least seven days in advance of any road work or closures caused by pipeline construction activities. During an open cut crossing, Pacific Connector would try to keep one lane of the road open for traffic, with detours around construction, plating over the open trench, or other methods. However, in some situations the road may have to be closed for a day when the pipeline would be installed across it. Where road closures occur, Pacific Connector would provide access around the construction site for local residents and emergency vehicles. Advanced signage would be used to provide notice of construction activities. In addition, Pacific Connector would utilize traffic control measures, such as signs, lights, barriers, and flaggers to ensure public safety and provide for efficient movement of traffic through or around the construction area, and to protect workers.

Pacific Connector's proposed pipeline route would cross numerous existing utilities, including other pipelines, powerlines, and cables. Prior to construction, Pacific Connector would contact the local "One Call" or "Call Before You Dig" system to determine the location of utilities to be crossed. These utility crossings would then be marked in the field during pre-construction surveys. Pacific Connector would coordinate with each utility owner/operator to design crossings. In most instances, the new pipeline would have to be installed beneath the existing buried utility to maintain the necessary depth of cover.

2.4.2.3 Aboveground Facility Construction

Aboveground sites would be cleared and graded as applicable to accommodate the planned facilities. Excavation would be performed as necessary to accommodate the new reinforced concrete foundations for meter and compressor station equipment. Forms would be set, rebar installed, and the concrete poured, finished, and cured in accordance with applicable standards. Concrete pours would be randomly sampled to verify compliance with minimum strength requirements. Backfill would be compacted in place, and excess soil would be used elsewhere or distributed around the site.

The meter and compressor station equipment would be shipped to the site by truck. The equipment would be off-loaded using booms, lifts, or cranes. The equipment would then be positioned on the foundation, leveled, grouted (if necessary), and secured with anchor bolts.

All non-screwed piping associated with the meter and compressor stations would be welded, except where connected to flanged components. All welds in high-pressure gas piping systems would be visually inspected and radiographically tested (or other non-destructive testing method) to ensure compliance with code requirements.

All components in high-pressure natural gas service would be strength tested prior to placing in service. Before being placed in service, all controls and safety equipment and systems would be checked and tested.

In all cases, MLVs would be installed within Pacific Connector's permanent easement. The installation of the MLVs would meet the same standards and requirements established for pipeline construction.

2.5 ENVIRONMENTAL COMPLIANCE AND MONITORING

2.5.1 FERC Environmental Compliance Monitoring

In preparing construction drawings and specifications for the Project, Jordan Cove and Pacific Connector would incorporate proposed mitigation measures identified in their applications, as specified in the Commission Order, and requirements of other federal, state, and local agencies. Jordan Cove's and Pacific Connector's construction contractors would also be provided copies of applicable environmental permits. Jordan Cove and Pacific Connector would conduct training for construction personnel regarding implementation of environmental permit requirements, and measures of specific mitigation plans. Environmental training would be conducted before and during construction.

During pipeline construction, Pacific Connector would be represented on each pipeline spread by a Chief Inspector, who would be responsible for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. In accordance with the FERC's *Plan*, the Chief Inspector would be assisted by at least one full-time EI per construction spread. The EI would report directly to the Chief Inspector and would have stop-work authority. The EI's responsibilities would include:

- identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;
- ensuring compliance with the requirements of the FERC's *Plan* and *Procedures* (including modifications), the environmental conditions of the section 3 and Certificate authorization, the mitigation measures proposed by the applicant (as approved and/or modified by FERC's authorization), other environmental permits and approvals, and environmental requirements in landowner easement agreements;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and soil stabilization needs in all areas;
- ensuring that the location of dewatering structures and slope breakers would not direct water into known cultural resources sites or locations of sensitive species;
- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity would be stopped and the design of the discharge would be changed to prevent reoccurrence;
- ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;
- advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- ensuring restoration of contours and topsoil;
- verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

- approving straw bales for use in dewatering structures, mulch, and/or erosion control and verifying that the straw is certified free of noxious weeds and soil pests;
- determining the need for and ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;
- inspecting and ensuring the maintenance of temporary erosion control measures at least:
  - on a daily basis in areas of active construction or equipment operation;
  - on a weekly basis in areas with no construction or equipment operation; and
  - within 24 hours of each 0.5 inch of rainfall;
- ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;
- keeping records of compliance with the environmental conditions of the FERC Certificate, and the mitigation measures proposed by the Project sponsor in the application submitted to the FERC, and other federal or state environmental permits during active construction and restoration;
- identifying areas that should be given special attention to ensure stabilization; and
- completing restoration after the construction phase.

In addition, the FERC staff would conduct inspections to monitor the Project for compliance with the Commission's environmental conditions and Project mitigation measures proposed by Jordan Cove and Pacific Connector, or required by regulatory and land management agencies. Pacific Connector has agreed to fund third-party environmental monitors to the extent determined necessary by FERC staff and the federal land-managing agencies during Project construction. The third-party environmental monitors would report directly to the FERC staff, the BLM designated official, and the land-managing agency with jurisdictional interest. Environmental monitors would be available on site during all phases of construction. The details of the scope-of-work and selection of the third-party contractor would be finalized prior to the start of construction.

2.5.2 Monitoring by Land Managing Agencies on Federal Lands

The POD developed by Pacific Connector[13] is part of the Right-of-Way Grant application and includes extensive monitoring requirements to ensure that impacts from construction and operation of the Project are minimized and that objectives of the respective land management plans are accomplished. The requirements from the 2013 POD are summarized in table 2.5.2-1. Ongoing discussion between the applicant and agencies are expected to result in revisions to the POD; therefore, changes to requirements in table 2.5.2-1 may also be made in the final EIS. Because the proposed actions specific to federal lands include amendments to LMPs, the regular monitoring and reporting programs of the respective BLM and Forest Service LMPs would be used in addition to those identified in table 2.5.2-1.

[13] Filed as a stand-alone report with Pacific Connector's June 2013 application to the FERC.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
1	Aesthetics Management Plan for Federal Lands	3.4.1 Key Observation Points (KOP)	These KOPs will provide a baseline from which to monitor mitigation implementation and success. Mitigation techniques may vary from what is listed below, depending on ongoing monitoring and consultation with agency land managers. Mitigation for KOPs would also include all general mitigation measures detailed in Sections 3.1 through 3.3 of POD Attachment 1.
2	Air, Noise and Fugitive Dust Control Plan	—	No requirements except reference to federal and state regulations that could include such monitoring requirements.
3	Blasting Plan	3.6 Monitoring of Blasting During Pipeline Construction (See also Sec. 3.3, Federal, State, County and Local Regulations/Restrictions)	Drilling and blasting would be completed in presence of, and following approval by Company inspector(s) present. Seismograph equipment would be used to measure blast induced vibration (peak particle velocity or PPV) in the vertical, horizontal, and longitudinal directions. Seismic monitoring may be discontinued at Company's discretion if the blasting schedule and blasting performance consistently produce PPVs lower than the maximum allowable limit. PPV would be recorded at any adjacent utility, water wells, potable springs and any aboveground structure within 200 feet of the blasting. Pacific Connector may photograph structures or facilities near blasting locations to document pre-blast conditions. Similarly, Pacific Connector may video record blast events. When blasting is completed in noise sensitive areas, peak noise and overpressure would be monitored and recorded in compliance with the stipulations outlined in the FERC's BA. A blasting log would be recorded immediately after each blast. Ground-motion monitoring would comply with applicable federal, state, and local regulations and permit conditions. See Section 5.0 of POD Attachment 3 for monitoring requirements for third party blasting within 200 feet of operational pipeline.
4	Communication Facilities Plan	2.0 Purpose	Each meter station and the compressor station would require a communications link with Williams Pacific Operator's gas control monitoring system in Salt Lake City. Therefore, radio antennas and towers would be required at each meter station, the compressor station, and on existing mountain top radio communication sites as required to create a communication link with Salt Lake City.
5	Contaminated Substances Discovery Plan	Page 1, paragraph 5	In response to Forest Service concern for the potential for naturally occurring mercury to reach the aquatic environment during construction of the pipeline near the historic Thomason mining property (see Attachment 1 to POD Attachment 5 – Potential for natural-occurring mercury mineralization to enter the aquatic environment between M.P. 109 and East Fork Cow Creek), additional temporary or short-term erosion control measures would be conducted at these sites throughout the construction phase and routinely monitored by an environmental inspector (EI) or authorized Company representative. See Figure 5 of Attachment 1 (to POD Attachment 5 to this plan for the location of hydrologic features G, J and K where erosion control measures would be in place before the fall rains and monitored for riling, gullying and other forms of erosion that may transport sediment into the aquatic environment (recommendations developed in consultation with ODEQ).
6	Corrosion Control Plan	2.1.3 Cathodic Protection Monitoring	The CP system would be tested and if necessary, adjusted at least once each calendar year, but not exceeding 15 months to ensure the CP system is providing acceptable levels of protection as outlined in DOT 49 CFR 192.465. Tests would be completed including Close Interval Survey (CIS) that measures pipe to soil potentials, electromagnetics, and guided wave ultrasonics. CP test stations would be located along the pipeline to allow Pacific Connector to routinely monitor voltage and current levels. See Attachment C to POD Attachment 6 for a sample test station drawing. See also POD Attachment 6, Sections. 2.2 (Atmospheric Corrosion), 2.3 (Internal Corrosion Control) and 2.4 (Inline Inspection) for additional pipeline corrosion inspection requirements, per DOT 49 CFR 192.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
7	Emergency Response Plan	1.0 Introduction	No specific monitoring requirements are identified, but reference is made to DOT 49 CFR 192.615 and 192.617, which includes requirements to minimize the hazards during pipeline operation resulting from a gas pipeline emergency. The required Public Safety Response Manual, to be distributed to the appropriate agencies and local authorities includes information on how to identify a gas leak.
8	Environmental Briefings Plan	2.0 Pre-Construction Reporting	Within 60 days of the acceptance of the BLM Right-of-Way Grant and before construction begins, Pacific Connector would file an initial *Environmental Inspection, BMP and Construction Compliance Implementation Plan* with the federal land-managing agencies' Authorized Office for review and written approval in accordance with the POD stipulations. The Company would file revisions to the plan as schedules change. This plan would include the number of EIs per spread and training procedures to ensure non-compliance problems are identified in a timely manner.
		4.0 Post Construction Reporting	After restoration is completed and the pipeline is in-service, Pacific Connector would initiate monitoring and reporting to the federal land-managing agencies on a quarterly basis, and continue such activities until all disturbed areas have been successfully stabilized and restoration is complete.
9	Erosion Control and Revegetation Plan (excluding FERC Plans in Attachments A and B)	3.3.1 Preconstruction Survey	EIs would verify the limits of the staked construction areas.
		3.3.3 Clearing and Grading	The flagged limits of disturbance would be maintained throughout all construction phases and would be monitored by EIs so activities are restricted to certificated limits.
		3.3.4 Installation of Erosion Control BMPs	All erosion control devices would be routinely inspected and any damaged or temporarily removed structures would be replaced at the end of each working day.
		3.3.8 Welding and Coating Pipe	All welds would be visually and radiographically inspected and repaired, as necessary. Prior to the final installation, the entire pipeline coating would be inspected and tested to locate and repair any faults or voids.
		3.3.10 Hydrostatic Testing	Pacific Connector would follow the procedures outlined in the *Hydrostatic Testing Pla*n (see POD Attachment 13) and POD Attachment 28, FERC's *Procedures,* to minimize potential effects from these activities (includes monitoring requirements).
		4.0 Best Management Practices	EIs would verify that turbid water does not reach a waters of the state and dewatering does not result in the deposition of sand, silt, and/or sediment. EIs would inspect and ensure the maintenance of temporary erosion control measures at least daily in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation and within 24 hours of each 0.5 inch or greater rainfall. Inspections would be recorded and records maintained for review upon request.
		4.1.2 Sediment Barrier	The EI would inspect temporary erosion control structures at least on a daily basis in areas of active construction and equipment operation. In areas where active construction and equipment operation are not occurring, inspections would be made at least weekly. All structures would be inspected by the EI within 24 hours of 0.5 inch or greater of rainfall. The EI would be responsible for ensuring that ineffective temporary erosion control measures are repaired as soon as possible but no more than 24 hours after discovery. Whenever possible, the EI would inspect erosion control measures in advance of predicted storm events and take preventative measures to minimize the potential for off right-of-way sedimentation.
		4.1.5 Dust Control	The EI would direct watering along the right-of-way, as necessary and would determine if water needs to be sprayed to control dust during sweeping operations on paved roads.
		4.2.3 Soil Compaction	Pacific Connector would test for soil compaction in agricultural and residential areas and on Forest Service and BLM lands, as specified in FERCs *Plan*. The EI would also test for soil compaction on UCSAs on federal lands to determine appropriate measures necessary to mitigate compacted areas.
		5.0 Waterbody Crossings	Any equipment required to enter a waterbody would be inspected to ensure it is clean and free aquatic invasive species, noxious weeds, dirt or hydrocarbons.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
9		6.0 Wetland Crossings	Sediment barriers would be properly maintained throughout construction and until effective ground cover is reestablished.
		7.0 Maintenance and Periodic Evaluation	The EI would inspect temporary erosion control structures at least daily in areas of active construction. In areas where active construction is not occurring, inspections would be made at least weekly. All structures would be inspected by the EI within 24 hours of 0.5 inch or greater of rainfall or as required by state and local jurisdictions. Whenever possible, the EI would evaluate erosion control measures prior to a predicted storm event and implement measures needed to prevent off right-of-way sedimentation. Inspections would be documented and available for agency review upon request.
		8.3 Water Discharge	EIs would visually monitor the release of hydrostatic test water and trench dewatering activities to ensure that no erosion or sedimentation occurs and that turbid water is not discharged to waters of the state. If an EI determines that a discharge is occurring from trench dewatering, the receiving water would be visually monitored for turbidity.
		10.0 Restoration and Revegetation	Pacific Connector would use a qualified specialist to test tiles for damage and to conduct any necessary repairs.
		10.12 Supplemental Wetland and Riparian Plantings	The transplanted root-pruned trees would be monitored annually according to FERC's *Procedures*. If the success rate drops below 80 percent a Forest Service authorized representative would be informed and a plan would be developed between the Forest Service and Pacific Connector to restock these sites.
		10.13 Supplemental Forest Plantings, Table 10.13-1	On BLM Districts (other than Lakeview) seedling growth/survival must be monitored the first fall following planting. Replant/interplant areas where tree stocking falls below minimal acceptable levels (300 trees per acre). On Forest Service land, monitor seedling growth/survival the first fall and third growing seasons following construction to ensure target stocking of 100-150 trees per acre. Replant/interplant areas where tree stocking falls below minimal acceptable levels in accordance with Oregon Department of Agriculture (ODA) requirements (ODA 629-610-00200).
		10.15 Mulch, Straw Mulch	Only certified weed-free straw and mulch would be used. However, if the certification program is not in place at the time of construction, or if there are not sufficient quantities of certified weed free straw available for the Project, Pacific Connector would request review/inspection of the straw by the local soil and water conservation district, county agent, or other appropriate official or authorized agency representative on federal lands.
		11.0 Steep and Rugged Terrain	During construction of the Project across rugged topography, Pacific Connector would be responsible for monitoring and maintaining right-of-way as necessary to ensure stability.
		12.0 Noxious Weeds, Soil Pests, and Forest Pathogens Control Plan	The ODA, BLM, and Forest Service have recommended that reconnaissance surveys be conducted along the pipeline route to determine the presence of noxious weeds and forest pathogens so that appropriate BMPs can be developed and applied prior to and during construction to prevent the introduction, establishment, or spread of noxious weeds and forest pathogens. Additionally, these agencies have recommended that construction equipment and vehicles be cleaned prior to moving them onto the construction right-of-way to prevent the import and spread of weeds and that vegetation clearing and grading equipment be cleaned if they pass through known noxious weed infestations. The ROW would be monitored after construction, and any noxious weed infestations would be controlled in accordance with permit and landowner stipulations.
		12.3 Equipment Inspection	Prior to transporting construction equipment to the right-of-way, allowing project inspector and construction contractor vehicles on the ROW, or allowing maintenance equipment on the right-of-way on federal lands, the EI or Company authorized representative would perform inspections and register or tag the equipment to ensure that it is clean and free of potential weed seed or propagules (using POD Attachment 14, Appendix 4 checklist). The EIs would also be responsible for random verification inspections during construction. To ensure the equipment is thoroughly inspected, the EI or authorized representative would use the inspection checklist provided in POD Attachment 14, Attachment D (Equipment Cleaning).

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
		12.4 Clearing and Grading	Infested areas and cleaning station locations would be mapped to ensure that they are monitored during construction (and on federal lands post construction). The infested areas and cleaning station locations would be mapped for future monitoring efforts to determine if potential infestations occur at these sites and, if they do, to ensure that appropriate treatments are applied.
		12.5 Weed-free Materials	If this certification process is not formalized at the time of construction, the straw can be inspected by the county extension agent or qualified conservation district personnel. Where straw is to be used on federal lands, the BLM's or Forest Service's authorized officer may also inspect and approve straw materials to verify that the straw is weed-free.
		12.6 Weed Control	The applicator would ensure that the herbicides are used according to the labeling restrictions and according to all applicable laws and restrictions and according to the appropriate land managing agency decision documents.
		12.9 Monitoring (Noxious Weeds and Pathogens)	Pacific Connector would implement three to five years of post-construction monitoring in areas of federal land where noxious weeds were identified and mapped prior to construction, as well as at equipment cleaning stations and hydrostatic dewatering sites. Monitoring would also occur in areas where rock, soil and straw was used on NFS Lands. Monitoring other areas of the right-of-way where noxious weeds were not known to occur prior to construction would occur as an ongoing function of Pacific Connector's operational personnel during the life of the Project. Pacific Connector's operational staff would also investigate noxious weed issues raised by landowners during operation of the pipeline.
		13.0 Maintenance	Pacific Connector would conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine revegetation success (in upland areas, if upon visual survey the density and cover of non-nuisance vegetation are similar in to adjacent undisturbed lands). If revegetation is not successful or there are excessive weeds, a professional agronomist shall determine the need for additional restoration measures. In wetland areas, revegetation would be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetland areas. If revegetation is not successful at the end of three years, Pacific Connector would develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate the wetland and would continue revegetation efforts until wetland revegetation is successful. Pacific Connector would monitor crops for at least two years to determine the need for additional restoration and would monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is deemed successful.
10	Federally-listed Plant Conservation Plan	3.0 (of Conservation Plan) Mitigation Plans for Federally-listed Plants	Pacific Connector would conduct environmental surveys of the pipeline right-way and authorized work areas in areas not previously surveyed where suitable habitat is present prior to construction once survey permission is granted. If populations of federally listed threatened or endangered species are identified, the EI would, where feasible, monitor the survey and flagging of the construction right-of-way and temporary extra work areas to clearly mark the limits of construction disturbance (i.e., clearing/grading), and would provide additional protective buffers or neck-downs to ensure protection of adjacent plant populations or provide additional avoidance. As applicable (for bulb salvaging), the EI would also monitor topsoil salvaging efforts during construction. Planting (reseeding) areas would be mapped (GPS) for subsequent monitoring purposes.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
10		5.0 or 6.0 (of Mitigation Plans) Monitoring	Pacific Connector would monitor revegetation success in the areas of restored federally listed threatened or endangered species populations for three to five years after construction, depending on the species. Where applicable, this monitoring would also determine the need for additional monitoring. Monitoring would occur where salvaged plants are transplanted from nursery condition stock to assess the success of the transplanting efforts as well as where collected threatened or endangered species seed is replanted. Monitoring would also occur for noxious or invasive weed infestations within disturbed areas of the construction right-of-way that could hinder revegetation success and threatened or endangered species populations in the area, as well as on portions of the construction right-of-way that were formerly considered as suitable habitat and are returned to, and maintained as, suitable habitat through planting of associated compatible native species. An annual monitoring report would be submitted to FERC and FWS by the end of each monitoring year.
11	Fire Prevention and Suppression Plan	1.2.1 Agency and Pacific Connector Roles and Responsibilities	Pacific Connector would accompany agency representatives on fire tool and equipment inspections and take corrective action upon notification of any fire protection requirements that are not in compliance.
		3.2.1 FS IFPR	During fire season, all Pacific Connector contractors would have their fire equipment inspected by an authorized Forest Service representative prior to work on NFS lands. All fire equipment used on the Project would be inspected annually by an authorized Forest Service representative.
		3.2.13 Monitoring (Construction)	Pacific Connector inspectors would inspect the construction right-of-way and Contractor operations for compliance with all provisions of this plan. In addition, federal, state, and local fire control agencies may perform monitoring inspections in areas under their jurisdiction
		4.2.2 Communications (Emergency Coordination, Suppression)	Upon discovery or notification of a fire in the project area during construction, all aircraft pilots controlled by Pacific Connector or its Contractor would monitor VHF frequency 122.85 when within 5 miles of a fire and broadcast their intentions.
		4.3 Monitoring (Emergency Coordination)	Extinguished fire sites would be monitored for a minimum of 24 hours or as required by the appropriate agency.
12	Fish Salvage Plan	2.1 Fish Exclusion	Both upstream and downstream block nets would be monitored for accumulated litter and debris that would be removed during the entire waterbody construction operation.
		2.2 Dewatering and Fish Removal	During dewatering, the construction site would be monitored to prevent stranding organisms.
		2.3 Fish Handling, Holding and Release	Holding container temperature and well-being of specimens would be frequently monitored to assure that all specimens would be released unharmed.
13	Hydrostatic Test Plan	2.6 Dewatering	Where water is being discharged in an upland area, Pacific Connector's Contractor is responsible for taking water samples, if required, for analysis.
		3.0 Source Water	The targeted ramping rate would be managed such that there is no significant decrease of river flows.
		6.0 Test Failure	EIs would monitor the length of the test section if a failure occurs to ensure that water released does not create erosion or sedimentation into sensitive areas.
		7.2.5 Temperature and Flow Effects	Where water source locations are proposed to be withdrawn from waterbodies, Pacific Connector's EIs would monitor the streamflows prior to withdrawal to ensure that aquatic biota within the streams are not adversely affected.
		7.3 Water Discharge	Hydrostatic test water would not be allowed to discharge directly to wetlands or waterbodies. If an EI determines that a discharge to surface water is occurring the receiving water would be visually monitored for turbidity. Additionally, if a discharge to surface water occurs, the dewatering operations would be immediately adjusted/reinstalled/maintained to ensure that the discharge to surface water is stopped and water quality standards are not exceeded.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
			EIs would monitor discharge activities (rate, and quality) and make appropriate adjustments to facilitate proper infiltration through the discharge structures to stay in compliance with permit conditions. EIs would also monitor the structures to prevent any potential failures or "break outs" from occurring to the structure. Pacific Connector's EIs would ensure all structures meet the performance standard of 100 percent. Pacific Connector's EIs would also ensure that all threaded valves and fittings that may be used on the hydrostatic test headers are cleaned of potential incidental oil and grease before the hydrostatic operations are conducted to minimize the potential for oil and grease contact from these potential incidental sources. If an EI determines that a discharge to a surface water is occurring, the receiving water would be visually monitored for turbidity.
		8.0 Monitoring	For a period of three to five years following completion of construction, operations personnel would inspect the right-of-way in areas where noxious weeds were identified and mapped prior to construction to ensure that potential infestations do not reestablish and spread. Monitoring would also occur in areas along the right-of-way where equipment cleaning stations and hydrostatic dewatering sites were located to ensure that infestations at these locations do not occur (see also POD Attachment 13, Section 7.2.4, pp. 15 and 17).
14	Integrated Pest Management Plan	1.0 Introduction	All disturbed areas of the construction right-of-way would be monitored after construction, and any noxious weed infestations would be controlled in accordance with permit and landowner stipulations.
		2.3 Equipment Inspection	Prior to transporting construction equipment to the right-of-way, allowing project inspector and construction contractor vehicles on the right-of-way, or allowing maintenance equipment on the right-of-way on federal lands, the EI or Company authorized representative would perform inspections and register or tag the equipment to ensure that it is clean and free of potential weed seed or propagules (POD Attachment 14, Appendix 4 checklist). The EIs would also be responsible for random verification inspections during construction.
		2.4 Clearing and Grading	Infested areas and cleaning station locations would be mapped to ensure that they are monitored during construction. These areas would also be mapped on federal lands post construction.
		During dewatering, the construction site would be monitored to prevent stranding organisms.	After construction and restoration, Pacific Connector would monitor (three to five years) all disturbed areas of the construction right-of-way for infestation of noxious and invasive weeds. Special attention would be given to areas where noxious weeds were identified and mapped prior to construction, as well to equipment cleaning stations and hydrostatic dewatering sites. Where treatment is required, monitoring would occur for three years following eradication. Monitoring report and agency siting forms (POD Attachment 14, Appendix 5) would be submitted to the appropriate federal land-managing agency annually. Pacific Connector may enter into cost-recovery agreements with federal land-managing agencies to conduct/participate in related monitoring efforts. Monitoring of all disturbed areas of the construction right-of-way where noxious weeds were not known to occur prior to construction would occur as an ongoing function of Pacific Connector's operational personnel during the life of the project. Pacific Connector's operational staff would also investigate noxious weed issues raised by landowners and land-managing agencies during operation of the pipeline. When landowners raise noxious weed issues, operational staff would conduct a site assessment (see POD Attachment 14, Appendix 5) and provide a proposed treatment plan (to the landowner or land-managing agency), if necessary.
		Appendix 3 Pesticide – Use Proposal (FSM 2150)	This and similar forms (for BLM) are to be used on federal land when pesticides are proposed for weed control. POD Attachment 14, Appendix 5) – Item 9e would be used to describe any monitoring of the operation.
		Appendix 5 Weed Monitoring Report Form	Used for annual monitoring at specific identified locations.
15	Klamath Project Facilities Crossing Plan		No requirements except reference to other plans that include monitoring requirements.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
16	Leave Tree Protection Plan	4.0 Uncleared Storage Areas	Pacific Connector EIs or Utility Inspectors would monitor the use of uncleared storage areas (USCAs) that are in a regenerating age class and which could be more susceptible to tree damage to ensure potential impacts from their use are minimized. Following completion of construction, Pacific Connector, BLM and Forest Service authorized representatives would assess tree damage (on their respective federal lands) within the UCSA's and other project areas for excessive live tree damage.
17	Overburden and Excess Material Disposal Plan		No specific reference to monitoring.
18	Prescribed Burning Plan	3.1 Private Lands and BLM-Managed Lands	POD Attachment 18, Item 4 is a specific reference to monitoring protocols for prescribed burning, which states: Before any prescribed burning is initiated burn bosses should have a well thought-out plan that takes into account "How weather would be monitored."
		Appendix H. Interagency Prescribed Fire Planning and Implementation Procedures Guide	Activity-specific Burn Plans are included as Appendix H to POD Attachment 18 (Prescribed Burning Plan). POD Attachment 18 references the Interagency Prescribed Fire Planning and Implementation Procedures Guide (USDA and USDI 2008). That document includes the following on monitoring on federal land: Fire Effects Monitor (FEMO): "The FEMO is responsible for collecting the onsite weather, fire behavior, and fire effects information needed to assess whether the fire is achieving established resource management objectives. The FEMO is responsible to: 1. Review the monitoring plan prior to implementation. 2. Monitor, obtain, and record weather data. 3. Monitor and record fire behavior data throughout the burn operations. 4. Recon the burn unit/area assigned. 5. Plot the burn area and perimeter on a map. 6. Monitor and record smoke management information. 7. Monitor first order fire effects. 8. Provide monitoring summary of the fire. 9. Provide fire behavior and weather information to burn personnel as appropriate." POD Attachment 18, Element 20. Monitoring: "Prescribed fire monitoring is defined as the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective. Describe the monitoring that will be required to ensure that Prescribed Fire Plan objectives are met. For the prescribed fire, at a minimum specify the weather (forecast and observed), fire behavior and fuels information and smoke dispersal monitoring required during all phases of the project and the procedures for acquiring it, including who and when."
19	Recreation Management Plan	3.0 Mitigation	After construction, pipeline monitoring would be conducted. Monitoring-related impacts to recreation would be minimized by (1): conducting inspections of pipeline sections on foot instead of by vehicle, where steep pipeline corridor sections are visible from nearby roads; and (2) conduct vehicle monitoring only during dry conditions.
		3.1 Specific Mitigation for Recreation Sites/Types	OHV Control and right-of-way access: Following construction, the effectiveness of the site-specific measures would be assessed in consultation with the land management agencies, on a periodic basis. Generally, these assessments would be made in conjunction with revegetation monitoring and in response to identified problem areas. Pacific Connector would be responsible for monitoring and managing unauthorized OHV use during the life of the Project. Brown Mountain Multi-Use Trails: Pacific Connector would engage in ongoing consultation and monitoring with local recreation groups and land managers during the construction phases and, if necessary, following construction to assess and modify the mitigation (i.e., OHV and snowmobile control measures).

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
20	ROW Clearing Plan for Federal Lands	2.1 Roles and Responsibilities	The BLM and Forest Service would be responsible for monitoring payment, log accountability, and trespass.
		2.1.1 Timber Cruise and Valuation	Pacific Connector would complete a check cruise on the cruises and appraisals completed by the BLM and Forest Service.
		2.1.3 Hazard Trees	FERC Compliance monitors in the field would review and approve as appropriate requests to remove hazard trees outside the approved construction area.
		2.2 Felling and Yarding	The BLM would be responsible for monitoring logging activities on BLM lands. The Forest Service would be responsible for monitoring logging activities on NFS lands.
		2.6 Best Management Practices	Each construction spread would have one lead EI and several assistant EIs to ensure compliance with federal, state, and local regulations and permit requirements.
		2.7 Timing Restrictions for ROW Clearing	Prior to timber clearing, Pacific Connector would have (1) experienced MAMU biologists survey both the occupied and unoccupied suitable habitat stands in which habitat would be modified by Pacific Connector construction and mark trees that currently have nest platforms or potential for nests, and (2) experienced NSO biologists survey known and potential NSO nest sites to determine occupied nesting activity so that appropriate seasonal timing restrictions could be applied during Year 1 timber clearing activities.
21	ROW Marking Plan	3.9 Permanent Marking	Pipeline markers would be maintained by replacing damaged line markers during pipeline patrols and surveys, which shall be at intervals of at least once each calendar year, but not to exceed 15 months.
22	Safety and Security Plan	2.1 Pacific Connector (Responsibilities)	Pacific Connector would observe and monitor Contractor's practices and procedures and would inform the Contractor of violations to the aforementioned regulations. Pacific Connector's Inspection Staff would also be trained to identify and report security issues to the Federal, State, and local law enforcement agencies. The construction right-of-way would be closed to the general public and monitored by Pacific Connector on a regular basis during all construction activities. After the pipeline has been put in service, Pacific Connector would conduct routine inspections of the permanent ROW (aerial fly over's, on the ground visits, etc.) to identify and correct any security or safety concerns. All visitors, workers, or monitors to the project site during construction shall be required to attend safety training.
		2.4 Construction Inspectors (Responsibilities)	It is the Construction Inspectors' responsibility to be an attentive, willing and proactive monitor, and observer of the Contractor's work practices and to record, report and if necessary halt all seemingly unsafe work practices.
		3.8 Damaged Pipe	Any dents, gouges, scratches or other similar defects would be brought to the attention of Pacific Connector's EIs as soon as they are detected.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
23	Sanitation and Waste Management Plan	3.1 Pacific Connector (Responsibilities)	Pacific Connector would be responsible for: • Ensuring that all company and Contractor management personnel understand and follow the sanitation and waste management requirements for the Project. • Ensuring that all wastes generated during the project are properly characterized/classified. • Ensuring that all waste and spills are handled in a manner consistent with the health and safety standards set by federal, state, and local waste regulations, and the Project's waste management requirements (see POD Attachment 24, SPCC Plan).
		6.0 Trash, Food Wastes, and Other Construction Debris	Pacific Connector's EIs and Utility Inspectors would ensure that these daily "house-keeping" measures are being conducted.
		9.0 Hazardous Wastes	Pacific Connector's EI(s) would inspect these storage areas on a weekly basis to ensure that the waste materials are properly packaged, labeled, and stored according to federal, state, and local regulations. Pacific Connector would ensure that the Contractor(s) disposes of all hazardous waste materials in approved facilities according to applicable federal, state, and local hazardous waste regulations and the SPPC Plan. Pacific Connector would also ensure that the Contractor(s) transports all waste materials with the proper shipping papers, placards, labels, and manifests, as required by transportation regulations.
24	SPCC Plan	IV.A.3. Leaks in hoses or fittings on equipment.	a. The contractor would visually inspect all equipment for leaks and repair all leaks prior to moving the equipment onto the construction ROW.
		IV.A.5. Fuel storage tanks and hazardous materials containers 55-gallons or greater.	b. Prior to their use, the contractor would visually inspect each tank for cracks, excessive corrosion, or other flaws which may compromise the integrity of the tank. Hoses and valves would be similarly inspected. c. The contractor would inspect the integrity of all dikes and the liner at least daily and repair the dikes or replace the liner immediately if they become breached or torn.
		IV.B.1. Material locations:	Each work site would have on hand and maintain emergency response equipment. While construction activities are ongoing, all such equipment would be inspected daily for operability and accessibility.
		V.F Spill Response	Pacific Connector's Environmental Representative would conduct clean-up inspection if required.
		VI.4 Cleanup and Disposal of Spills	If necessary, the EI may require the contractor to collect samples of soil strata below the spill to assure that all contaminated soils have been removed from the site.
		VI.4 Cleanup and Disposal of Spills	All materials used to clean up the spill would be double bagged and inspected prior to removal from the spill site.
		VII. Response to Hydrostatic Test Failure	On federal lands, all hydrostatic test failure sites resulting in any breach shall be reviewed by a federal inspector in conjunction with EI.
25	Transportation Management Plan	1.0 Introduction	A final TMP would be submitted by Pacific Connector to the Agencies for approval prior to issuance of the Grant. It includes a plan for monitoring roads and bridges.
		2.2.2 Straightening, Widening, Cut and Fill, Culverts and Bridges	Pacific Connector would be responsible for all expenses incurred in the use of existing roads and provide funding to reimburse the federal land managing agency for expenses incurred by the agency in required design reviews, monitoring, and approvals during project planning and construction. Pacific Connector's Contractors would conduct an assessment of major culverts crossed by Pacific Connector access roads to determine those that may require modifications or replacement for necessary equipment access.
		2.3 Wet Weather Access	To minimize the potential for both road-related and off-road resource damage, Pacific Connector would perform road surfacing structural capacity assessments and place additional road surfacing (aggregate or bituminous) as needed for the planned use. All work necessary to place the roads in a useable condition for wet weather traffic would be completed prior to use and monitored during use.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
		2.4 Controlling Off-Highway Vehicle Use and the ROW	Pacific Connector would be responsible to monitor and control unauthorized OHV use during the life of the Grant and would implement additional measures as necessary to control OHV access.
		3.0 Transportation Management Practices	Such (noxious weed control) measures include requirements for equipment cleaning and inspections and the use of noxious weed free materials.
26	Unanticipated Discovery Plan	2.0 Training	Training would occur as part of the preconstruction on-site training program for foremen, EIs, construction supervisors, and all other supervisory personnel who supervise any construction or inspection activities.
		3.0 Procedures for the Inadvertent Discovery of Human Skeletal Materials, Item # 8	If an avoidance technique is possible, construction shall resume and would be monitored by a professional archaeologist and the appropriate Tribe(s) if they request to do so.
		4.0 Procedures for the Inadvertent Discovery of Archaeological Materials, Item # 5	(a) If such a technique is possible, construction shall resume and would be monitored by a professional archaeologist and the appropriate Tribe(s) if they request to do so.
27	Upper Rock Creek ACEC	Page 2, paragraph 2	To further minimize potential impacts to the ACEC and to ensure that effects to the values of the ACEC are avoided, the following construction and restoration measures would be implemented: • Prior to construction, Pacific Connector would survey and clearly mark the limits of the construction ROW, TEWAs, and USCAs to ensure all project disturbance is minimized and confined to the certificated working limits. • Pacific Connector would monitor restoration efforts after construction to ensure erosion control and revegetation efforts are successful and to treat any noxious weed infestation if necessary.
28	Wetland and Waterbody Crossing Plan	2.0 Waterbody Crossings (page 14, last paragraph)	Any equipment required to enter a waterbody would be inspected to ensure it is clean and free of dirt or hydrocarbons.
		5.0 Monitoring	Consistent with FERC's *Procedures*, monitoring of restored wetlands would be conducted by a qualified biologist during the growing season annually for a minimum of three years following construction. Information on plant survival, percent vegetative cover, as well as hydrologic conditions would be collected. Vegetation cover would be estimated (ocular) within a 2.5-meter radius that is representative of the site. All species would be listed by stratum and percent cover for each species. Hydrologic indicators and conditions (i.e., water marks or drift lines, sediment deposits, evidence of ponding, etc.) would be visually monitored to determine if wetland hydrology has been reestablished. Photographs would be taken to support the monitoring efforts. Wetland revegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetlands. If performance standards are not met in three years, additional monitoring and mitigation may be required (e.g., replanting, soil amendments, selection of alternative species, etc.). Annual reports would be prepared and submitted to the COE, ODSL, and the federal land managing agency by December 31.
		Attachments 2 / 3 1.0 Purpose of Flumed/Dam and Pump Stream Crossings	Flumes/dams require monitoring and occasional repair during the crossing period to ensure the integrity of the structure(s).
		4.0 Material Required to Install and Maintain a Flumed Stream Crossing	Before the flume pipe is installed in the stream, it would be inspected to assure that it is free of grease, oil or other pollutants. In addition, excessive dirt would be removed from the flume pipe. If oil or grease is present on the flume pipe, it would be steam-cleaned before the flume pipe is placed in the stream.
		6.0/5.0 Installation of the Flume Pipe/Dams	Turbidity sampling would be conducted during all flumed/dam and pump crossings in accordance with the Stormwater Pollution Prevention Plan.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Attachment #	Attachment Title	Attachment Section	Monitoring Requirement
28	Wetland and Waterbody Crossing Plan	7.0/6.0 Maintenance of the Flume/Dam and Pumps During Construction	Flumed/dam-and-pump crossings require constant monitoring and occasional repair during the crossing process. While the flume/dam and pumps are in place, the contractor would provide a sufficient crew that would be responsible for maintaining the flume/dam and pump crossing.
		13.0/11.0 Dewatering the Construction Area	If the water level in the construction area exceeds the upstream or downstream level of the dams, the environmental inspectors would notice small amounts of turbid water escaping into the stream either upstream or downstream of the dams. The contractor would carefully inspect each pump prior to its delivery to the crossing site. In particular, any frayed hoses or apparent leaks would be repaired before the pumps are delivered to the crossing site. Pump heads and the hoses would be cleaned of any free hydraulic oil prior to placing the pump heads into the stream.
		14.0/13.0 Backfilling the Ditch	The contractor must carefully monitor the effectiveness of the pumps and control the rate of backfill to preclude bleeding through the downstream dam.
29	BLM and Forest Service Mitigation Agreements	See 40 CFR 1502 (c) and 2011 CEQ circular on monitoring.	As the parties responsible for implementation of the off-site mitigation program, the BLM and Forest Service would be responsible for overall monitoring of the mitigation program and would report progress on implementation annually to FERC and Pacific Connector. The report would note the following stages for implementation of each project on the Plan and overall compliance with the Agreements in Principle between each Agency and the Proponent. 1. Notice of Project on Agency Schedule of Proposed Actions 2. Site-specific surveys completed 3. NEPA Decision (Decision Memo, Decision Notice or Record of Decision) 4. Funds Obligated 5. Contract awarded 6. Work Completed 7. Project Complete and Contract Closed 8. Remaining funds, if any returned to mitigation pool. 9. Overall status of funding and project implementation

2.6 OPERATION AND MAINTENANCE PROCEDURES

2.6.1 LNG Terminal Facilities

Jordan Cove would operate and maintain its facilities in compliance with 49 CFR 193, 33 CFR 127, and other applicable federal and state regulations. Before commencing operation of the LNG terminal, Jordan Cove would prepare and submit for approval operation and maintenance manuals that address specific procedures for the safe operation and maintenance of the LNG storage and processing facilities. Jordan Cove would also prepare an operations manual that addresses specific procedures for the safe operation of the ship unloading facilities in accordance with 33 CFR 127.305. Operating procedures would address normal operations as well as safe startup, shutdown, and emergency conditions.

All operations and maintenance personnel at the terminal would be trained to properly and safely perform their jobs. The terminal operators would be trained in the potential hazards associated with LNG, cryogenic operations, and the proper operations of all the equipment. Jordan Cove states that the operators would meet all the training requirements of the Coast Guard, DOT, ODOE, Oregon State Fire Marshall, Coos Bay, Coos County Fire Department, and other regulatory entities. The SORSC would provide on-site resources and assets, including a Sherriff's office and fire department.

The LNG terminal and related facilities would be staffed with about 145 full-time employees working three shifts, so there would be coverage 24 hours a day, 365 days a year. The terminal's full-time staff would conduct routine maintenance and minor overhauls. Major overhauls and other major maintenance would be handled by bringing in maintenance personnel specifically trained to perform the maintenance. All scheduled and unscheduled maintenance would be entered into a computerized maintenance management system.

2.6.2 Pipeline and Associated Aboveground Facilities

Pacific Connector would test, operate, and maintain the proposed facilities in accordance with DOT regulations provided in 49 CFR Part 192; FERC's guidance at 18 CFR 380.15; rules and regulations promulgated by PHMSA; and maintenance provisions of FERC's *Plan* and *Procedures* (including modifications). The pipeline right-of-way would be clearly marked where it crosses public roads, waterbodies, fenced property lines, and other locations as necessary. All pipeline facilities would be marked and identified in accordance with applicable regulations.

The aboveground facilities would be inspected for the life of the pipeline at intervals that meet DOT requirements. Pipeline personnel would perform routine checks of the facilities, including calibration of equipment and instrumentation, inspection of critical components, and scheduled and routine maintenance of equipment. Safety equipment, such as pressure-relief devices, fire detection and suppression systems, and gas detection systems, would be tested for proper operation. Corrective actions would be taken for any identified problem. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides.

To facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide would be maintained in an herbaceous state, with no vegetation greater than 6 feet in height. Trees that are located within 15 feet of the pipeline and that are greater than 15 feet in height would be cut and removed from the right-of-way. Vegetation within the permanent easement would be periodically maintained by mowing, cutting, and trimming (either by mechanical or hand methods). Maintenance activities are expected to occur approximately every three to five years depending on the growth rate. During maintenance, trimmed or cut vegetation would be across the permanent easement to naturally decompose and to discourage OHV traffic. Occasionally, where site conditions allow, chipping of this material may also occur. Herbicides would not be used in or within 100 feet of a waterbody's mean high water mark. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming, and herbicides (selectively).

Pacific Connector would employ a permanent staff of five employees. These permanent operational employees would be stationed and reside at different locations along the pipeline route, but would report to a main office in Eugene, Oregon. In addition, the pipeline and aboveground facilities would be monitored all the time using Pacific Connector's gas control communication system and radio towers reporting back to a command center at the Williams' office in Salt Lake City, Utah.

2.7 FUTURE PLANS AND ABANDONMENT

Jordan Cove has no current plans that would result in the future expansion of its proposed LNG export terminal. Jordan Cove has, however, retained the capability within the proposed design to add the equipment necessary for import of LNG should natural gas market conditions change in the future. In order to either expand the LNG terminal or convert it into an import facility, Jordan Cove would have to file a new and separate application with the FERC, and the proposal outlined in the application would be considered a new undertaking. That new, separate application would be subject to an independent environmental review by the FERC staff, with appropriate input from stakeholders, and the Commission would have to issue a new, separate Order providing authorization if it found the proposal acceptable. That Order may contain new and different environmental conditions.

Jordan Cove does not anticipate abandonment of the proposed LNG export terminal facility in the foreseeable future (more than 30 years). If at some point Jordan Cove did propose to abandon the LNG terminal, it would seek authorization from the FERC to do so. This would involve filing a new and separate application for abandonment under section 7b of the NGA. The FERC staff would then conduct a new environmental review, including input from stakeholders. Again, after the environment review is completed, the Commission would consider whether or not to grant abandonment through the issuance of a new Order.

In its June 10, 2014, MOU with the ODE, Jordan Cove committed to providing a retirement cost estimate and funding surety that is consistent with the EFSC Retirement and Financial Assurance Standard at OAR Chapter 345 Divisions 21 and 22. The MOU stipulates that Jordan Cove would do the following:

- before beginning construction of the LNG terminal, Jordan Cove would submit to the ODE a detailed engineering estimate of the cost to retire and restore the facility;
- before beginning construction, Jordan Cove would post with the ODE a bond or letter of credit to cover the amount in the estimate to retire the facility;

- two years prior to closure of the LNG terminal and the associated power plant, Jordan Cove would develop a final retirement plan, in consultation with Coos County, to be approved by the ODE; and
- Jordan Cove would retire the facility in a nonhazardous condition, so that the land could be restored to future productive use.

At this time, Pacific Connector has no foreseeable plans for future expansion of the facilities. The present design allows for significant future expansion by installation of additional compression only.

In the future, if Pacific Connector proposed to abandon the pipeline facilities, a new separate application would be made to the FERC, under Section 7(b) of the NGA. The application must contain a statement providing in detail the reasons for the abandonment and the impact to customers whose service would be terminated. The application would include an environmental report as specified by 18 CFR § 380.3(c)(2). The FERC staff would conduct an environmental review, including input from stakeholders, before the Commission would consider authorizing abandonment in an Order.

The federal land-managing agencies would need to evaluate any proposed abandonment under the terms of the Right-of-Way Grant. The BLM must consider the final disposition of the pipeline facilities in accordance with 43 CFR 2886, and would require Pacific Connector to address termination and restoration issues in its final POD.

3.0 ALTERNATIVES

To adhere to the CEQ regulations for complying with the NEPA (at 40 CFR Part 1502.14), the EIS must evaluate reasonable alternatives. This EIS compares the environmental impacts of the proposed action against a range of alternatives.

Each of the cooperating agencies with obligations under NEPA can use this alternatives analysis as part of their decision making process. Individual agencies would ensure consistency with their own administrative procedures prior to accepting the recommendations in this EIS.

In accordance with the NEPA and Commission policy, we have evaluated a number of alternatives to the JCE & PCGP Project to determine if any are reasonable and environmentally preferable to Jordan Cove's and Pacific Connector's proposed action. Alternatives considered, which are described in more detail below, include the No Action Alternative, system alternatives, LNG terminal alternatives, pipeline route alternatives, and aboveground facilities alternatives.

Alternatives were evaluated against the purpose and objectives of the JCE & PCGP Project, as described in section 1.3 of this EIS. Jordan Cove's primary objective is to construct and operate a West Coast terminal that can export up to 6 MMTPA of LNG to overseas markets. Pacific Connector's primary objective is to transport at least 0.9 Bcf/d of natural gas to the Jordan Cove terminal, from western Canadian and Rocky Mountain sources received at the Malin hub. In addition, Pacific Connector could service customers in southern Oregon through an interconnection with Northwest's existing Grants Pass Lateral.

The FERC's evaluation criteria for selecting alternatives include whether they:

- are technically and economically feasible, reasonable, and practical;
- offer a significant environmental advantage over the proposed action; and
- have the ability to meet the objectives of the Project.

With respect to the first criterion, it is important to recognize that not all conceivable alternatives are technically and economically feasible and practical. Some alternatives may be impracticable because they are unavailable and/or incapable of being implemented after taking into consideration costs, existing technologies, and the overall Project purpose. In assessing route alternatives, the pipeline must be buildable and safe.

For pipeline route alternatives, in most cases we used desktop data for comparisons, including USGS topographic quadrangle maps, aerial photography, NWI maps, site file searches, and literature reviews. However, in some cases, where a previously proposed route is now an alternative, Pacific Connector may have conducted on-the-ground environmental surveys. While the raw data were collected by the applicants, the FERC staff and cooperating agencies performed the alternatives analyses, which included validation of data supplied by the applicants.

The narrative below explains why a particular alternative was found to be environmentally preferable. In conducting a reasonable analysis, we considered environmental advantages and disadvantages, and focused the assessment on those alternatives that may minimize impacts on specific resources. In general, shorter is better. One mile of a 95-foot-wide corridor would impact about 12 acres. Other elements that may influence the selection of an alternative route included the avoidance of historic properties or habitat for federally-listed threatened or endangered species, reduction of crossings of waterbodies or wetlands, minimization of impacts to LSRs and Riparian Reserves, avoidance of geological hazards, distances from residences, and lessening of forest clearing, or impacts on agricultural land and specialty crops. In some cases, there were tradeoffs between environmental resources identified during analyses of route alternatives, as minimization of impacts on one suite of resources had to be compared to increased impacts on a different set of resources.

We considered a range of alternatives in light of the Project's objectives, feasibility, and environmental consequences. Each alternative is considered until it is clear that the alternative would not satisfy one or more of the evaluation criteria.

3.1 NO ACTION ALTERNATIVE

3.1.1 Federal Energy Regulatory Commission's No Action Alternative

If the Commission denies the application or the applicants choose to not construct the Project (the No Action Alternative), the objectives of the proposed Project would not be met and the resource impacts disclosed in this EIS would not occur. However, the selection of the No Action Alternative could result in the use or expansion of other existing or proposed LNG facilities and associated interstate natural gas pipeline systems, or the construction of new infrastructure to meet the objectives of this proposed Project (i.e., to make natural gas available for export to Asian as well as Hawaiian and Alaskan markets). In section 3.2 below, we examine natural gas and LNG system alternatives. Any expansion of existing systems or construction of new facilities would result in specific environmental impacts that could be less than, similar to, or greater than those associated with the proposed Project.

3.1.2 Federal Land Management Agencies' No Action Alternative

The BLM and Forest Service alternatives are specific to agency actions associated with the proposed Pacific Connector pipeline route. The No Action Alternative is the same for each of the affected BLM Districts and National Forests with respect to amendment of LMPs. Under the No Action Alternative, the RMPs of the Coos Bay, Roseburg, Medford, and Klamath Falls Resource Area of the Lakeview District and the LRMPs of the Rogue River, Umpqua, and Winema National Forests would not be amended to make provision for the Project. Under the No Action Alternative, the Forest Service would not consent to the BLM to grant an easement since construction of the Project would not be consistent with the National Forest LRMPs. The BLM would not issue a Right-of-Way Grant for the Project because the Project would not be a conforming use of federal land. Under the No Action Alternative, there would be no need for Reclamation to concur with BLM with respect to issuance of a Right-of-Way Grant.

Because the application for a Right-of-Way Grant for the Project involves lands managed by two or more federal agencies, the BLM is the lead agency for issuance of the Right-of-Way Grant for occupancy of federal lands under the provisions of the FLPMA. BLM may not issue the grant until the designated federal officials administering the federal lands involved have concurred with issuance. Where concurrence is not reached, the Secretary of the Interior, after consultation with these agencies, may issue the grant, but not through lands within a federal reservation where doing so would be inconsistent with the purposes of the reservation (43 CFR 2884.26). Under the No Action Alternative, the Secretary of the Interior could issue the Right-of-Way Grant without the concurrence of the BLM and Forest Service if the Secretary determined the Project was not inconsistent with the purposes of the reservations.

3.1.3 U.S. Army Corps of Engineers' No Action Alternative

There are three scenarios that the COE would consider under the No Action Alternative. The first would be that no COE permit would be necessary under the RHA and Section 404 of the CWA because no wetlands or waters of the U.S. would be crossed or affected. Under the second scenario, other alternatives would be adopted so that impacts on aquatic resources would be avoided, as in the case where the pipeline route would be entirely moved to upland locations. The third scenario would be that the Project would not be authorized or would not be built or operated.

3.1.4 Renewable Energy Alternatives

Commenters[1] have suggested that the Project could be replaced by renewable energy resources alternatives. Renewable energy resources include, but are not limited to, wind power, solar power, tidal power, and hydropower. All of these alternatives represent alternative means of producing electrical power. Because the Project's purpose is to prepare natural gas for export to foreign and domestic markets, the development or use renewable energy technology would not be a reasonable alternative to the proposed action.

3.2 SYSTEM ALTERNATIVES

System alternatives could make use of other existing or proposed pipelines and LNG facilities to meet the objectives of the proposed Project; however, some modifications or additions to these existing systems may be necessary. These modifications or additions would result in environmental effects that may be less than, similar to, or greater than those associated with this Project.

3.2.1 Existing Pipeline Systems

Existing pipeline system alternatives would involve the use of all or portions of other natural gas transmission systems in lieu of construction of the proposed Pacific Connector pipeline. Existing natural gas pipelines in southwestern Oregon include jurisdictional interstate transportation systems operated by Northwest, GTN, and Ruby, and the non-jurisdictional intrastate Coos County Pipeline. These existing pipelines are illustrated on figure 3.2-1, and are further discussed below. As the narrative discussion below explains, we did not find any existing pipeline systems that could replace the proposed Pacific Connector pipeline, and did not identify any existing systems that could be considered reasonable, feasible, or practicable alternatives to the proposed Project, and none that could achieve the Project objectives with significantly fewer environmental impacts.

[1] See, for example, the October 30, 2012, filing in this proceeding by Citizens Against LNG.

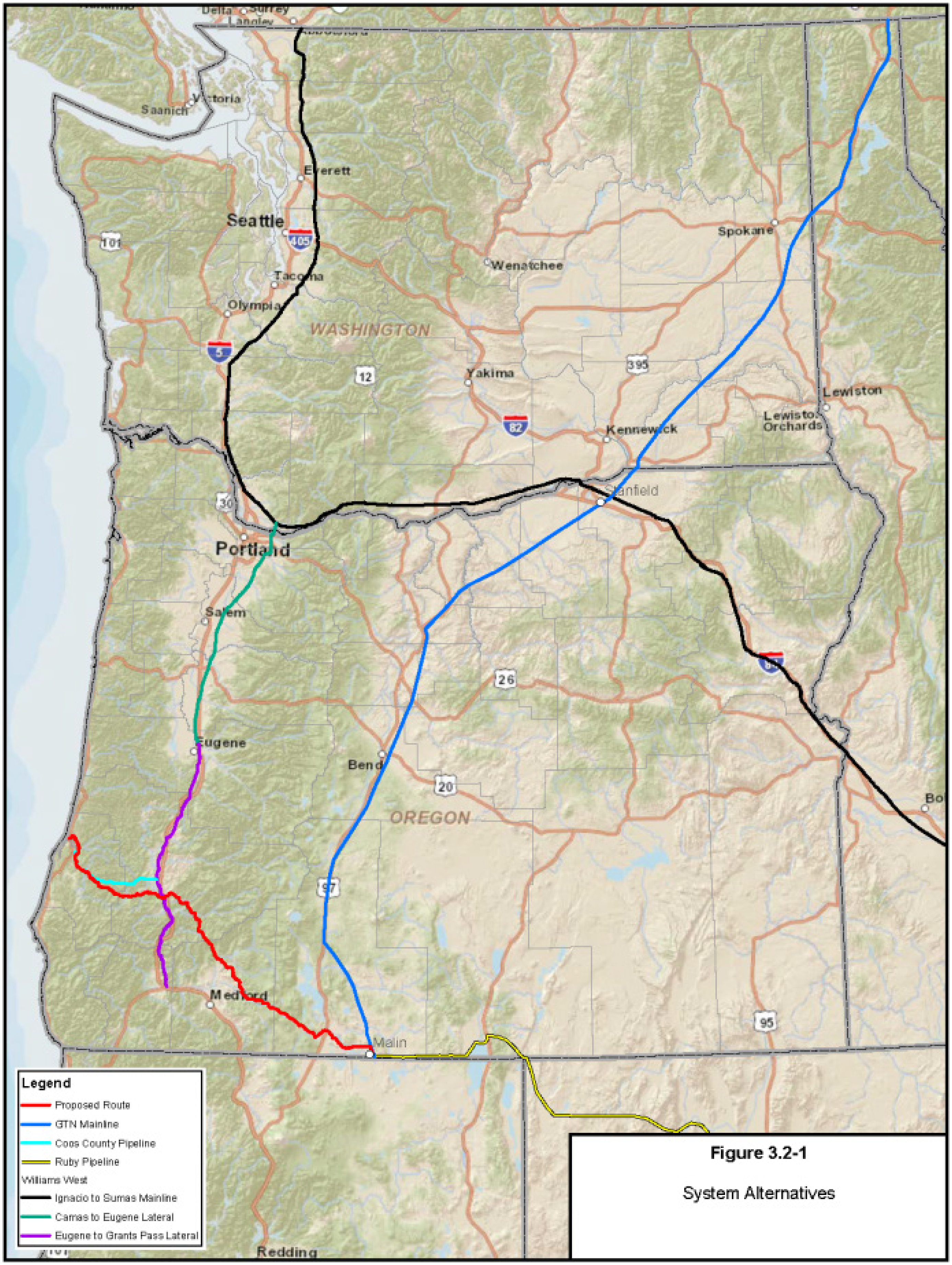


Figure 3.2-1

System Alternatives

Northwest is a 3,900-mile-long bi-directional transmission system crossing the states of Washington, Oregon, Idaho, Wyoming, Utah, and Colorado. This system provides access to British Columbia, Alberta, Rocky Mountain, and San Juan Basin natural gas supplies. The Northwest system has a peak design capacity of 3.4 Bcf/d (Williams Northwest Pipeline 2008). Northwest's Grants Pass Lateral extends from Eugene to Grants Pass, Oregon, roughly parallel to the route of I-5. The lateral includes 131 miles of 16-inch and 10-inch-diameter pipelines. Pacific Connector indicated that Northwest's Grants Pass Lateral does not have the capacity to deliver the volumes necessary to meet its Project objectives. Nor does the Grants Pass Lateral traverse from near the Malin hub, where available volumes of western Canadian and Rocky Mountain natural gas supplies could be accessed. Therefore, the Grants Pass Lateral does not have the ability to meet the objectives of the Project and we have not evaluated it any further in our analysis of pipeline system alternatives. However, we will examine the route of the Grants Pass Lateral as a partial pipeline route alternative in section 3.4.1 of this EIS.

The GTN system includes 612 miles of pipeline beginning at Kingsgate, British Columbia, traversing through northern Idaho, southeastern Washington, and central Oregon, and terminating near Malin, Oregon (where it interconnects with Tuscarora and PG&E lines). Natural gas for the GTN pipeline originates primarily from western Canadian supplies; although it can receive Rocky Mountain gas through interconnections with Northwest near Spokane and Palouse, Washington and Stanfield, Oregon. The GTN system can transport about 2.9 Bcf/d (GTN 2008).

The Ruby pipeline was constructed by the El Paso subsidiary of Kinder Morgan, Inc., extending about 680 miles from near Opal, Wyoming, to Malin, Oregon. The 42-inch-diameter pipeline, placed into service in July 2011, has a capacity of about 1.5 Bcf/d at an operating pressure of 1,440 psig. The purpose of the pipeline is to transport Rocky Mountain gas to markets in southern Oregon, northern Nevada, and northern California. At Malin, Ruby interconnects with Tuscarora and PG&E. It was reported in September 2013 that deliveries from Ruby were down to an average of 684 million cubic feet per day (MMcf/d).

Neither GTN nor Ruby can meet the proposed Pacific Connector pipeline objectives. Both GTN and Ruby terminate at Malin. The purpose of Pacific Connector is to extend a pipeline between Malin and Coos Bay to the Jordan Cove terminal. Any expansions of the GTN or Ruby pipelines to Coos Bay would have similar environmental impacts to the Pacific Connector pipeline.

There is an existing non-jurisdictional 12-inch-diameter pipeline that extends some 60 miles, over the Coast Range, from the Northwest Grants Pass lateral, near Roseburg, to Coos Bay. This pipeline was constructed by Coos County and is operated by Northwest Natural as a local distribution company (LDC). The Coos County Pipeline has a MAOP of 1,000 psig and was designed to bring gas to the communities around Coos Bay. The terminus of the Coos County Pipeline is approximately 7.7 miles south of the proposed Jordan Cove LNG terminal. Northwest Natural built a line from the terminus of the Coos County pipeline across Coos Bay to the North Spit, as part of its LDC system. LDCs are intrastate systems that are regulated by the state, and do not come under the jurisdiction of the FERC.

It is possible that the Coos County Pipeline could be converted into a jurisdictional facility, and used as a system alternative to the proposed Pacific Connector pipeline, assuming the necessary modifications were made to the Coos County Pipeline to allow gas flow to the Jordan Cove LNG terminal from Northwest's Grants Pass Lateral. However, the maximum gas flow through the Coos County Pipeline would be a very small fraction of the capacity required for the proposed Jordan Cove LNG terminal. At a normal operating pressure of 600 psig on Northwest's Grants Pass Lateral, the maximum volume of natural gas that can be transported on the Coos County Pipeline to the city of Coos Bay and on the Northwest Natural pipeline to the North Spit is 0.018 Bcf/d at a delivery pressure of 554 psig. At an operating pressure of 800 psig on Northwest's Grants Pass Lateral, the maximum volume of natural gas that can be transported on the Coos County Pipeline to the city of Coos Bay and on Northwest Natural's pipeline to the North Spit is 0.036 Bcf/d at a delivery pressure of 680 psig. Because the diameter and available capacity of the Coos County Pipeline are too small, it could not meet the objectives of the Project.

3.2.2 Existing or Proposed LNG Facilities

3.2.2.1 LNG Terminals on the U.S. Gulf and East Coasts

There are nine existing LNG import terminals on the East Coast and Gulf Coast of the United States.[2] There are proposals before the FERC to convert some of the existing import facilities to export LNG. Four LNG export terminals have been authorized by the Commission: Cheniere Sabine Pass (CP11-72-000) and Cameron (CP13-25-000 and CP13-27-000) in Louisiana; Freeport LNG Development on Quintana Island in Texas (Docket Nos. CP12-29-00 and CP12-509-000); and Dominion Cove Point in Maryland (CP13-113-000). There are six applications currently under review by the FERC for LNG export terminals along the Gulf Coast or East Coast: Cheniere Corpus Christi (CP12-508-000), Excelerate-Lavaca (CP14-71-000 and CP14-73-000), and Golden Pass-Sabine Pass (CP14-517-000) in Texas; Trunkline-Lake Charles (CP14-120-000) and Magnola-Lake Charles (CP14-347-000) in Louisiana; and Elba Island in Georgia (CP14-103-000).[3] There are four newly proposed LNG export terminals currently under review through the FERC's Pre-filing process along the Gulf Coast: CE FLNG (PF13-11-000) and Louisiana LNG (PF14-17-000) on the Mississippi River in Louisiana; Gulf LNG (PF13-4-000) in Mississippi, and Downeast LNG in Maine (PF14-19-000).

We do not consider any of the proposed LNG export terminals on the East Coast or Gulf Coast to be reasonable or practicable alternatives to the Jordan Cove proposal, because they would not meet the main objectives of the Project. Jordan Cove seeks to be the first LNG export terminal on the West Coast of the continental U.S., with the goal of serving markets around the Pacific Rim. LNG vessels taking cargos from the proposed LNG export terminals along the East Coast and Gulf of Mexico would have substantially longer and less direct routes to Asian markets than would LNG vessels loading at the Jordan Cove terminal. For example, the distance from the Gulf Cost to Shanghai via the Panama Canal is approximately 4,000 miles longer than the distance between the Oregon Coast and Shanghai, and the voyage currently takes 63 days compared to 16 days from the West Coast to Shanghai. Furthermore, Jordan Cove proposes to acquire its natural gas from western Canadian and Rocky Mountain sources, competitively priced at the Malin hub. The Gulf Coast LNG export terminals most likely would be acquiring

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[2] The existing LNG import terminals on the East Coast and Gulf Coast of the United States are: Everett, Massachusetts; Cove Point, Maryland; Elba Island, Georgia; Pascagoula, Mississippi; Sabine , Louisiana; Cameron, Louisiana; Lake Charles, Louisiana; Sabine Pass, Texas; and Freeport, Texas.

[3] Golden Pass-Sabine Pass, Trunkline-Lake Charles and Elba Island are existing LNG import terminal, while Cheniere Corpus Christi, Excelerate-Lavaca, and Magnola-Lake Charles would be new facilities. In addition, Cheniere Sabine Pass requested an expansion in Docket No. CP13-552-000.

natural gas from sources in Texas and Louisiana priced at the Henry hub. Dominion Cove Point would probably be receiving natural gas supplies from the Appalachian Basin.

3.2.2.2 Existing LNG Terminals on the West Coast of North America

Alaska

There is only one existing onshore LNG export terminal on the West Coast of North America: the plant located on the Kenai Peninsula Borough, Alaska. This facility was constructed in 1969 and lately was being operated by ConocoPhillips Natural Gas Corporation and Marathon Oil Company to export LNG primarily to Japanese markets. However, it was recently shuttered, due to declining natural gas reserves and wellhead deliverability in the Cook Inlet region.

Because the export authorization for Kenai expired on March 31, 2013, ConocoPhillips recently submitted two applications to the DOE. One was for a blanket (two-year) authorization to export LNG to FTA nations. This was approved in DOE/FE Order No. 3392 on February 19, 2014. The second application was for a blanket (two-year) authorization to export LNG to non-FTA nations. The application to export to non-FTA nation was noticed in the *Federal Register* on January 20, 2014, and the application is currently under review by DOE.

Because of its remote location, the Kenai LNG terminal cannot access other sources of natural gas outside of the Cook Inlet region. Moreover, Kenai does not have sufficient capacity to serve the broader Asian markets that would be served by the proposed Jordan Cove Project. As a result, we conclude that the Kenai LNG export terminal cannot meet the objectives of the Project.

Mexico

There are two existing LNG import terminals on the West Coast of Mexico. One is known as Costa Azul LNG, located about 14 miles north of Ensenada, Baja Mexico. Owned by Sempra Energy, this import terminal started operations in May 2008. It has the capacity to send out about 1 Bcf/d of natural gas, intended to supply customers in northwest Mexico.

The other LNG import terminal on the West Coast of Mexico is farther south, at the port of Manzanillo. This terminal, jointly owned by Samsung C&T, Mitsui Trading, and Korea Gas, went into operation in 2012, and has the capacity to take in 3 million tons of LNG per year.

We are unaware of any plans to convert the LNG import terminals on the West Coast of Mexico to export facilities. Such a conversion would require the installation of liquefaction trains. Extensive pipeline construction would be required to transport Rocky Mountain and Canadian gas to Mexico if they were converted to export LNG. Therefore, the Mexican terminals do not meet the Project objectives.

3.2.2.3 Existing LNG Storage Facilities in the Pacific Northwest

Four LNG storage facilities currently exist in the Pacific Northwest. These are peak shaving plants that liquefy natural gas, store it as LNG, and then vaporize the LNG back into natural gas for use during periods of peak demand.

In Oregon, Northwest Natural owns and operates two peak shaving LNG storage plants. One is located in Portland, and has a 28,000 m^3 tank with a storage capacity of 600 MMcf/d. The other is located in Newport and has a 48,000 m^3 tank and a storage capacity of 1.0 Bcf/d. In Washington, Northwest owns and operates a peak shaving LNG storage plant in Plymouth with a liquefaction capacity of 19.7 MMcf/d, a storage capacity of 60,000 m^3, and a vaporization capacity of 300 MMcf/d. In Gig Harbor, Washington, Puget Sound Energy (PSE) operates a small LNG peak shaving plant with a capacity of 31 Bcf, and a maximum withdrawal rate of 3 Bcf/d.

We considered the possibility of converting one of the existing peak shaving LNG storage plants into an LNG export terminal as a system alternative to the proposed Project. The Northwest Plymouth, Washington peak shaving plant is located on the Columbia River, but is upriver of several dams, and so it would not be accessible to LNG vessels. The PSE peak shaving plant at Gig Harbor, Washington is located about 1 mile from the harbor and would not be accessible to LNG vessels. While it may be feasible to construct a pipeline to transmit LNG from the harbor to the PSE peak shaving facility, such a pipeline would have additional associated environmental impacts. The Northwest Natural Portland, Oregon peak shaving plant is located on the Willamette River and would potentially be accessible to LNG vessels. However, the waterway for LNG marine transit would be over 100 miles long and the navigation channel is obstructed by a bridge at Ross Island that only has clearances of 120 feet high and 100 feet wide. The Northwest Natural Newport, Oregon, peak shaving plant is on the coast; however, the port of Newport is relatively small, with channel depths ranging from 20 to 30 feet. The port at Newport could not accommodate LNG vessels without extensive dredging. Therefore, we conclude that converting any of the existing peak shaving LNG storage plants in the Pacific Northwest into LNG export terminals would not provide a significant environmental advantage to the proposed Project.

3.2.2.4 Proposed West Coast LNG Export Terminals

There are current proposals to construct LNG export terminals in British Columbia, Canada, and Alaska and Oregon in the United States. These other alternative LNG export proposals are in various stages of planning and review, as discussed below.

Proposed LNG Export Terminals in Oregon

There is one other proposed LNG export terminal in Oregon, located at Warrenton, in Clatsop County. On October 10, 2008, LNG Development Company LLC and the Oregon Pipeline Company, subsidiaries of the Leucadia National Corporation (hereafter referred to together as Oregon LNG), filed applications with the FERC under Docket Nos. CP09-6-000 and CP09-7-000. However, Oregon LNG is currently proposing to convert its pending LNG terminal to a bi-directional facility that would also be capable of exporting LNG with a revised pipeline route; and re-initiated the FERC Pre-filing environmental review process in July 2012 in Docket No. PF12-18-000. At the same time, a companion proposal was submitted by Northwest for its Washington Expansion Project (WEP) in Docket No. PF12-20-000, to supply natural gas to the Oregon LNG terminal. On June 7, 2013, Oregon LNG filed formal applications with the FERC in Docket Nos. CP09-6-001 and CP09-7-001 for its proposed export terminal and its associated pipeline to connect to the Northwest system. On June 25, 2013, Northwest filed its formal application with the FERC in Docket No. CP13-507-000 for its WEP.

On May 31, 2012, Oregon LNG received DOE approval to export up to 9.6 MMTPA of LNG (equivalent of 1.3 Bcf/d of natural gas) to FTA nations in FE Docket No. 12-48-LNG. Oregon

LNG received permission from DOE to export LNG to non-FTA nations on July 31, 2014, in FE Docket No. 12-77-LNG.

Oregon LNG's proposed marine facilities would include a 135-acre turning basin, dredged to -50 feet MLLW, requiring the removal of about 1.2 mcy of material. It would have a single berth designed to handle LNG vessels sized from 70,000 m^3 to 266,000 m^3 in capacity. Oregon LNG anticipates that its terminal would be visited by about 125 LNG vessels per year. The berth would be connected to the onshore facilities via a 2,128-foot-long trestle, including an LNG transfer pipeline.

Onshore, the LNG terminal facilities would occupy 74 acres within a 96-acre tract controlled by Oregon LNG. The terminal facilities would include a feed gas pretreatment plant, two liquefaction trains capable of producing 4.5 MTPY of LNG each, and two 160,000 m^3 LNG storage tanks. The terminal would also have a vaporization system consisting of shell and tube heat exchangers, with a natural gas sendout capacity of 0.5 Bcf/d.

Oregon LNG would install a new 36-inch-diameter 86.8-mile-long natural gas bidirectional pipeline to connect the LNG terminal with the Northwest system near Woodland, Washington. The proposed pipeline would have a capacity of 1.25 Bcf/d of natural gas, with an MAOP of 1,440 psig. It would cross through Clatsop, Tillamook, and Columbia Counties, Oregon, and Cowlitz County, Washington. About 11 percent of this pipeline route (9.9 miles) would follow existing rights-of-way for roads, railroads, and powerlines. Construction of the pipeline and associated aboveground facilities would affect about 1,200 acres, with about 533 acres retained for the permanent right-of-way. Aboveground facilities would include a meter station at the LNG terminal, another at the interconnection with Northwest, and a single 48,000 hp electric-drive gas compressor station within a 19-acre tract at about MP 80.9.

Northwest proposes to construct and operate about 140 miles of 36-inch-diameter pipeline looping for its WEP. The loops would be divided into 10 segments, adjacent to Northwest's existing pipeline system between Sumas and Woodland, Washington, and would cross portions of Whatcom, Skagit, Snohomish, King, Pierce, Thurston, Lewis, and Cowlitz Counties. In addition, Northwest would make modifications at five existing compressor stations (Sumas, Mt. Vernon, Snohomish, Sumner, and Chehalis), and would install new or relocate existing MLVs and launchers and receivers at 25 locations. Construction of the new facilities would affect about 1,940 acres total, of which 1,214 acres would be within Northwest's existing easement. About 63 acres would be added to Northwest's permanent right-of-way for operation of the new facilities. The WEP could provide about 1.25 Bcf/d of natural gas to Oregon LNG through the proposed interconnection at Woodland.

The proposed Oregon LNG and WEP Projects can be considered a viable alternative to the JCE & PCGP Project. The Oregon LNG Project can meet the same basic objectives of the Jordan Cove LNG Project, of constructing and operating a West Coast LNG export terminal that could service foreign markets in Asia. Also, through the WEP and interconnection with Northwest, Oregon LNG could access natural gas supplies from western Canada and the Rocky Mountains.

The FERC has not completed its environmental review of the combined Oregon LNG and WEP Projects; and we have not yet issued a draft EIS for the projects. It would be premature, prior to the issuance of the draft EIS, to assume that the combined Oregon LNG and WEP Projects would have either significant environmental impacts or advantages over the proposed JCE & PCGP Project.

Proposed LNG Export Terminals in British Columbia, Canada

Limited information is available regarding seven LNG export projects being considered in British Columbia (table 3.2.2.4-1).

TABLE 3.2.2.4-1.

Canadian Projects Under Consideration

Project	Terminal Location	Gas Source	Permit Status	Output (Bcf/d)
BC LNG Project	Douglas Island, near Kitimat, B.C.	Western Canada	Pending	0.25
LNG Canada Project	Port Edward, Prince Rupert Island, B.C.	Western Canada	Starting Process	1.54
Pacific Northwest LNG Project	Lelu Island, near Kitimat, B.C.	Western Canada	Starting Process	0.95
Kitimat LNG Project	Kitimat, B.C.	Western Canada	Approved	0.70
BG Group PLC and Spectra Energy Corp	Prince Rupert Area	Western Canada	Preliminary Stage	Unknown
Imperial Oil Ltd.	British Columbia	Western Canada	Preliminary Stage	Unknown
Unknown	British Columbia	Western Canada	Preliminary Stage	Unknown

Like the Jordan Cove Project, the proposed British Columbia LNG export terminals would be located on the Pacific Coast of North America, and could potentially serve markets in Asia, as well as customers in Hawaii and Alaska. The main source of the natural gas for the British Columbia terminals would be from the Canadian province of Alberta. There are unresolved environmental, construction-related, and monetary issues regarding building new pipelines over the Canadian Rockies from the gas-producing regions in the interior to the terminals located on the coast. In addition, there are regulatory and First Nation issues that are unique to Canada. The timeframe for obtaining permits and constructing facilities so that the British Columbia LNG export terminals could operate is still unclear.

Proposed LNG Export Terminals in Alaska

Alaska LNG

On September 5, 2014, Alaska LNG filed an application with the FERC to begin the environmental and safety review needed for federal authorization to build their project (PF14-21-000). The project sponsors are North Slope producers ExxonMobil, ConocoPhillips, and BP, as well as pipeline company TransCanada and the State of Alaska. The project includes a facility to cleanse produced gas of carbon dioxide and other impurities; an approximately 800-mile pipeline from Alaska's North Slope to the liquefaction plant; and an LNG plant, storage, and shipping terminal at Nikiski, 60 air miles southwest of Anchorage along Cook Inlet.

The 42-inch-diameter pipeline would be built to carry 3.0 to 3.5 Bcf/d of natural gas. Alaskans would use some of this gas, and running the pipeline and LNG plant would consume some. The plant would have the capacity to make up to 20 MMTPA of LNG, processing 2.5 Bcf/d of gas. The pre-front-end engineering design (FEED) is expected to be completed in late 2015 or 2016.

Although the Alaska LNG project would provide an export terminal on the West Coast of North America, it would not be able to access the gas supplies from western Canada and the Rocky

Mountains. Thus, the Alaska LNG project cannot meet all of the objectives of the proposed Jordan Cove LNG Project.

Alaska Gasline Port Authority LNG Project

In July 2012, the Alaska Gasline Port Authority (AGPA) filed for DOE approval to export approximately 2.5 Bcf/d of LNG to FTA nations. The AGPA is proposing to develop liquefaction facilities and an export terminal in Port Valdez, Alaska. The exact location of this export facility is unknown at this time; however, the AGPA's preferred site for the facility would be in Anderson Bay. The source of the gas for this export facility would be Prudhoe Bay and Point Thomson fields in Alaska's North Slope. Per an information request by the DOE, AGPA has stated that "a process was in place for construction of a pipeline to deliver gas to Port Valdez." AGPA's FTA application is still being reviewed by the DOE.

Although the AGPA project would provide an export terminal on the West Coast of North America, it would not be able to access the gas supplies from western Canada and the Rocky Mountains. Thus, the AGPA project cannot meet all of the objectives of the proposed Jordan Cove LNG Project.

3.3 LNG TERMINAL ALTERNATIVES AT COOS BAY

The Project applicant selects the location of its facilities. The FERC then conducts an environmental review of that location, and compares the proposed facilities against other identified feasible and reasonable alternatives to determine if any alternative may be environmentally preferable.

3.3.1 Regional Review of Potential Ports in the Pacific Northwest

Section 3.3 of the FERC's May 2009 FEIS for the import proposal in Docket No. CP07-444-000 explained how Jordan Cove selected the Coos Bay location for its LNG terminal. Jordan Cove started by examining 7 ports in California, 14 in Oregon, and 17 in Washington. The company then identified ports in the Pacific Northwest with deep enough channels for LNG vessels. For each deep-water port in its study area, Jordan Cove considered other obstructions that may prohibit LNG vessel transit, population densities, conflicts with other users, and the availability of a large enough tract of industrially zoned land that could contain all its proposed facilities.

At Coos Bay, Oregon, Jordan Cove found a deep-water port that could accommodate the draft of LNG vessels. The transit for LNG vessels within the waterway would be relatively short: 7.5 miles along the navigation channel to the terminal. There are no obstructions along the waterway. There has been declining commercial shipping at the Port of Coos Bay over the last 20 years, so there would not be significant conflicts with other Port users, and the Port is taking an active role in encouraging the location of an LNG terminal. There are no residences within 1 mile of the proposed terminal. The Jordan Cove property is currently open land zoned for industrial development, and is large enough to accommodate all proposed facilities and the surrounding vapor hazard zone. After reviewing these data, the FERC was unable to identify any other alternative port location on the Northwest Pacific Coast that could meet the objectives of the Jordan Cove Project and that would have significant environmental advantages over Coos Bay.

3.3.2 Coos Bay Terminal Alternatives

3.3.2.1 Sites on the North Spit

Within Coos Bay, Jordan Cove originally looked at four tracts of industrial land on the North Spit as potential LNG terminal locations (figure 3.3-1). No sites were considered by Jordan Cove above NCM 9 because the existing railroad bridge across Haynes Inlet would be a constraint to LNG vessels. Jordan Cove's criteria included that the tract be 200 acres in size or larger, and be zoned for industrial use. The sites below NCM 9 considered by Jordan Cove as potential locations for its terminal include the following:

Parcel A – Southport Forest Products

This parcel, comprising less than 100 acres, was eliminated from further consideration by Jordan Cove because of its limited size.

Parcel B – Former Weyerhaeuser Linerboard Mill

This parcel was once part of the historic Jordan Ranch. Between 1961 and 2003, it was the site of a mill operated by Menasha and then Weyerhaeuser, which has since been removed. This site is too close to the railroad bridge over Coos Bay at NCM 9 to allow for the creation of an access channel and berth to handle LNG vessels. However, Jordan Cove has acquired this parcel from Weyerhaeuser, and intends to construct and operate its non-jurisdictional South Dunes Power Plant at this location, together with associated facilities and its gas processing plant.

Parcel C – Roseburg Forest Products

The Roseburg Forest Products site is not large enough to accommodate two 160,000 m^3 full containment LNG storage tanks, while maintaining thermal and vapor exclusion zones within the site property and conforming to the property set-back requirements established under National Fire Protection Association (NFPA) 59A. Jordan Cove would locate temporary construction work areas, and a haul road, within the Roseburg tract.

Parcel D – Henderson Ranch/Ingram Yard

Parcel D is Jordan Cove's proposed terminal location. The historic Henderson Ranch tract is located immediately to the west of the Roseburg property. When this parcel was owned by Weyerhaeuser, it was known as the Ingram Yard and used to store logs for the linerboard mill. During the 1970s, the COE deposited materials dredged from the Coos Bay navigation channel at this site. This parcel was recently purchased by Jordan Cove, and was selected as the site of its liquefaction processing plant and LNG export terminal. The parcel is large enough to contain the proposed marine slip, LNG storage tanks, liquefaction trains, and any vapor released from facilities within property Jordan Cove owns or controls.

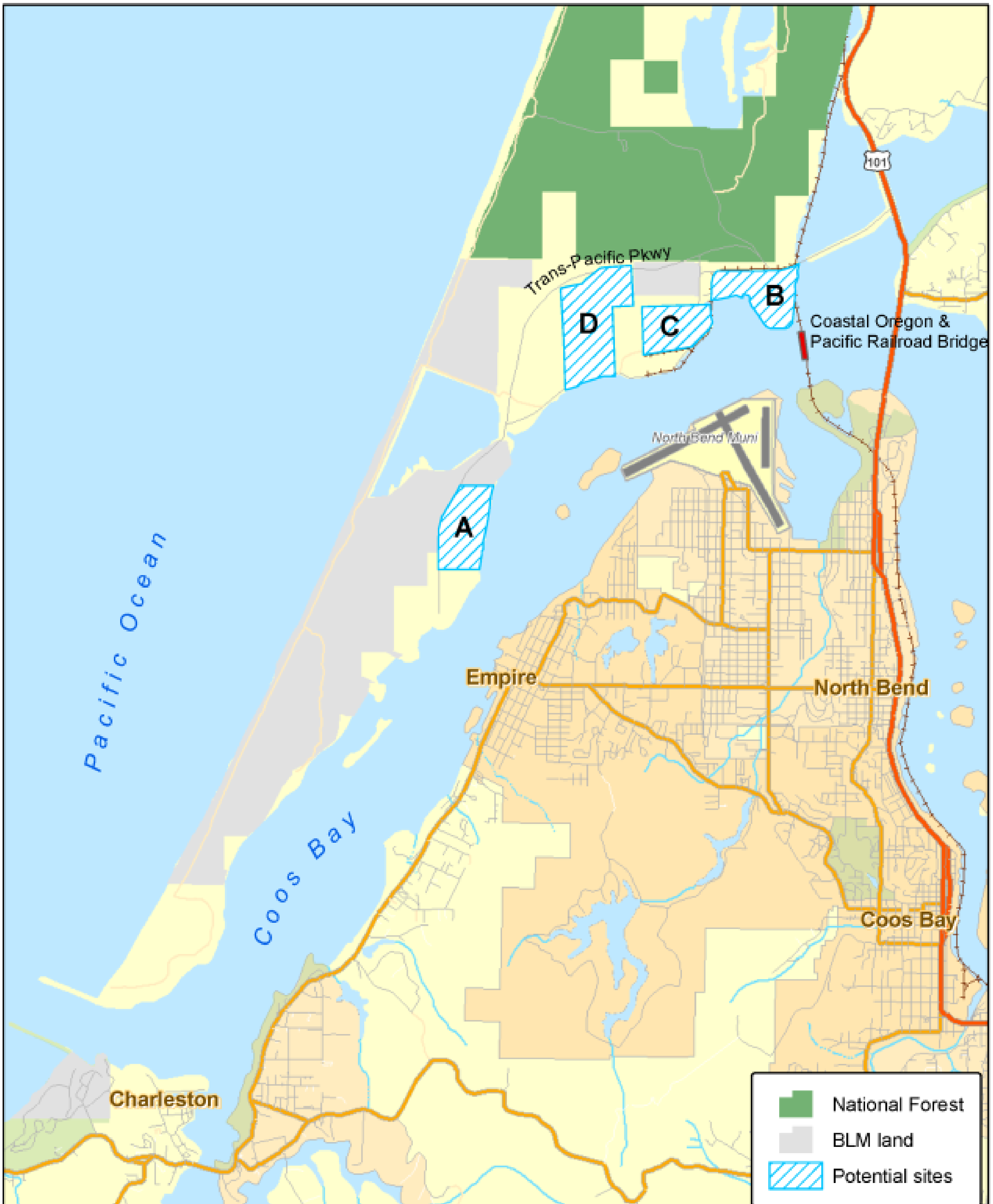
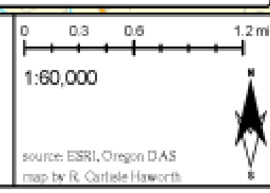


Figure 3.3-1
Potential Coos Bay Area
Project Sites



Other Coos Bay Potential Sites

D.B. Western has a manufacturing plant located on the North Spit of Coos Bay below the Southport property at NCM 5.6, about 2 miles southwest of the proposed Jordan Cove LNG terminal site. This tract is just south of Parcel A, which is shown on figure 3.3-2. D.B. Western is currently negotiating with potential clients regarding the possibility of serving as a coal depot and overseas shipping terminal. Previously, this concept was pursued by the Port, but its partners dropped out in April 2013. The idea was to transport coal from Montana and Wyoming via railroad to Coos Bay, where it would be stored and then shipped overseas to markets in Asia. D.B. Western has indicated that if it could reach an agreement with the Port and the COE to deepen and widen the Coos Bay navigation channel and build a new access channel and slip for coal ships at its North Spit plant site, it would willing to include a berth for LNG vessels.[4]

As an alternative to its current proposal, Jordan Cove could relocate its LNG export terminal to the D.B. Western property and an adjacent Port tract. The Port owns a parcel of at least 68 acres to the northeast of the D.B. Western plant that Jordan Cove originally sought to use to store materials dredged from Coos Bay during creation of the access channel for its LNG import terminal proposal in Docket No. CP07-444-000. The Port Commercial Sand Stockpile Site was eliminated from the currently proposed LNG export terminal in Docket No. CP13-4830-000, because now Jordan Cove intends to place materials dredged during creation of the access channel to raise the elevation at the site of its South Dunes Power Plant. The Port refers to its currently undeveloped property at NCM 5.7 on the North Spit as the North Bay Marine Industrial Park. We eliminated the D.B. Western and North Bay Marine Industrial Park from further consideration as an alternative site for the LNG terminal because even combined these two tracts are probably not large enough to contain all of Jordan Cove's proposed facilities, including a multi-user slip, storage tanks, liquefaction trains, electric plant, and gas treatment plant.

3.3.2.2 Alternative Marine Slip Design

The COE suggested that we examine the possibility of a smaller marine slip at the Jordan Cove terminal. The COE believes that the size of the marine slip could be reduced because the Coast Guard's WSA and LOR limited the size of LNG vessels calling on the Jordan Cove terminal to not larger than 148,000 m^3 in capacity, and there is currently no client for the western berth.

The concept of Jordan Cove's marine slip being excavated out of uplands on the North Spit adjacent to Coos Bay was to create separation between LNG vessels docked at the terminal berth and other ship traffic using the existing navigation channel. As explained in sections 2.1.1.12, 2.4.1.4, 4.4.2.1, 4.4.3.1, and 4.6.2.2 of this EIS, excavating the slip from uplands separated from the bay should minimize impacts on wetlands and aquatic resources. In addition, the currently designed LNG vessel berth at the slip would use fewer piles than the berth analyzed in our May 2009 FEIS (located on the same parcel), resulting in reduced impacts from construction noise and vibration on aquatic species in the bay.

Jordan Cove designed its marine slip to accommodate three berths: (1) on the east side for LNG vessels; (2) on the north side for tugs and escort boats; and (3) on the west side for unspecified commercial ships. The concept of a multiple berth slip was to allow for both future terminal and

[4] The Port's proposed coal depot was discussed in Jeff Barnard, April 1, 2013, "Coos Bay Coal Port's Last Partner Drops Out of Proposal," *Huffington Post*. D.B. Western's plans to revive the coal depot were provided to staff by personal communication on September 20, 2013, with Dennis Beetham, CEO of D.B. Western, Inc.

Port development plans. The LNG berth on the east side of the slip could handle LNG vessels as large as 217,000 m^3 in capacity, although the current navigation channel could only be used by LNG vessels less than 148,000 m^3 in capacity. It is possible that in the future, the Port and COE may increase the width and depth of the Coos Bay navigation channel (as mentioned in section 2.2.5 of this EIS), to allow for its use by larger deep-draft container ships. If the dimensions of the navigation channel are enlarged, it could also be used by larger LNG vessels, if the Coast Guard permits that after reviewing a revised WSR submitted by Jordan Cove in the future.

The Port has plans to increase the commercial use of Coos Bay. This includes a proposed dry bulk cargo terminal, a coal export terminal, an intermodal container terminal, and sea wind turbine assembly area at Henderson Marsh, using the western berth of the Jordan Cove slip, all considered under the general rubric of the Port's "Oregon Gateway Marine Complex." Reducing the size of Jordan Cove's marine slip would prohibit its future use by larger LNG vessels, if permitted by the Coast Guard, and its future use by other commercial ships. Building a smaller slip now and expanding it in the future to meet the Port's goals in a separate project could result in greater resource disturbance compared to building a larger, multi-user slip in one project. Therefore, we do not find that a smaller slip would offer significant environmental advantage over Jordan Cove's currently proposed marine slip design.

3.3.2.3 Underground LNG Storage Tank Alternative

Commenters recommended that the LNG storage tanks could be placed underground for greater safety, and to reduce their visual impacts. While burying tanks is an established technique in many parts of the world, local soils and geologic conditions determine the feasibility of such an approach. In the case of the Henderson Ranch/Ingram Yard tract, the geotechnical investigation, performed to identify surface and subsurface soils conditions, established the water table to be approximately 10 feet below the existing ground surface. With the thickness of the tank foundation slab established by design specifications at approximately 5 feet, any burying of the tank below the present design configuration would cause the foundation to be below the water table. This raises serious engineering design and environmental problems. The groundwater would need to be continually pumped from the subsurface area in the vicinity of the LNG tanks to avoid the potential for contact with the underground tank heat coils, resulting in potential disruptions to groundwater flow, as well as, an additional water discharge from the Project. The high heat transfer coefficient of water would result in an excessive amount of power being used to energize the heat coils. The mobility of the water would greatly exacerbate this problem because as the water was warmed it would flow away from the coils due to the natural groundwater migration pattern in this area. The warmed water would then be replaced by cold water resulting in still greater power consumption requirements. Therefore, we do not find that burying the tanks would offer significant environmental advantage over Jordan Cove's currently proposed design.

3.3.2.4 Electric Power Alternatives

The Jordan Cove LNG terminal would need electricity to power the liquefaction trains and other facilities. Jordan Cove plans to provide for its own power needs by constructing and operating the South Dunes Power Plant. Below, we discuss other alternatives for electric power.

Existing Electric Power Infrastructure

The Bonneville Power Administration (BPA) is the sole source of wholesale power to the region's various electric cooperatives. In a 1999 study, BPA noted uncertainties in terms of providing additional residential and commercial power demands. Jordan Cove's own investigation came to the conclusion that the local public utility system could not meet the power needs for the LNG export terminal if it relied solely on BPA to provide electricity. Therefore, Jordan Cove planned to construct and operate its own source of electricity through the 420-MW South Dunes Power Plant to be located adjacent to the terminal on land owned by Jordan Cove. The LNG terminal would, however, also be connected to the local distribution company, PacifiCorp, to provide power during times when the South Dunes Power Plant may be temporarily shut down. In addition, Jordan Cove could sell excess electricity generated from the South Dunes Power Plant, above what is needed for liquefaction and terminal operations, back to the grid for local consumption.

Wind Power

We considered the possibility of using wind power to replace or augment the electric power needed for the LNG terminal liquefaction process, through the currently planned South Dune Power Plant. As discussed below, we are not certain that wind energy alternatives could replace all the 420 MW needed for the Jordan Cove LNG terminal that would be generated by the planned South Dunes Power Plant. Nor do we find that wind farms would offer significant environmental advantage over Jordan Cove's currently proposed design.

Existing and Proposed Wind Farms

According to the State of Oregon 2013-15 Biennial Energy Plan, by 2012 wind energy production in Oregon made up nearly 6 percent of Oregon's total net generation and over 75 percent of the total non-hydroelectric sources of renewable energy. More than 4,000 MW of large-scale wind farms were in different phases of the ODE-EFSC process at the start of 2013. Most of the state's large-scale wind development takes place in the central and eastern Columbia River Plateau and in northeastern Oregon.

The ODE has stated that: "Wind machines generate, on average, about one third of the maximum output or capacity" (ODE 2005). If this "de-rating" is applied to the entire existing and proposed wind capacity of 4,000 MW from all of the onshore Oregon wind farms combined, they would produce about 1,320 MW of sustained output. It is unrealistic to assume that about one-third of the total electrical output from existing and proposed wind farms in Oregon would be redirected to the Jordan Cove terminal, and not serve other customers.

There are a number of problems that limit the availability of electricity generated by wind farms. First, there is no known technology for storing electric power generated by wind turbines. While the turbines are turning, electricity is generated that must be immediately conveyed to customers via transmission lines. Second, there is the limitation of existing transmission line infrastructure between where most of the wind power is generated (eastern Oregon) and markets (population centers in western Oregon). Third, there is limited space on existing transmission lines for wind power, and there is competition for access to some lines.[5]

Wind generation suffers from what is referred to as a "clustering effect." This clustering effect means that all the machines within a specific farm tend to generate power at approximately the same time, as the wind blows. This results in spikes in supply or troughs in production that have no relationship with demand. This clustering also means that power transmission lines in the vicinity of a wind farm may experience congestion.

Wind farms are also not without environmental impacts. The turbines are known to adversely affect bird and bat populations. Wind farms have visual impacts as well.

Principal Power Proposed Off-shore Wind Project

Principal Power, under a $4 million grant from the DOE, is proposing to anchor five 6 MW semi-submerged wind turbine modules approximately 3 miles off the coast of Coos Bay, Oregon, in waters of the Pacific Ocean about 1,000 feet deep. If the Principal Power Project is funded and constructed, Jordan Cove has agreed to purchase the 30 MW of electricity produced. That would eliminate the need to have the Principal Power Project connected to the regional electric grid. The electricity produced by the Principal Power turbines would supplement the electricity generated from Jordan Cove's planned South Dunes Power Plant. However, in addition to the 30 MW that may be provided from Principal Power, Jordan Cove would still need at least 390 MW to maintain reliable LNG production. The South Dunes Power Plant would also be necessary to supply power to the Jordan Cove terminal when the wind is not blowing and the Principal Power Project is not operating. Lastly, the Principal Power Project is one of seven DOE grants and may not be selected for full funding and construction.

Solar

The bulk of solar power installations in Oregon are geared to residential or individual building use and not as a commercial base load installation. Commercial solar projects require large land areas. The largest commercial solar farm in Oregon is located in Christmas Valley, in Lake County. Known as the Outback Solar Project, it includes more than 20,000 solar panels arrayed over 40 acres, generating up to 5 MW of electricity.

The constraints related to the production of solar power on a major scale include the siting of solar farms in mostly clear and sunny geographic regions, large tracts needed for the arrays of solar panels, the location of nearby transmission lines, and access to the grid. There may not enough sunlight to generate much solar energy during the cloudy winter months along the southern Oregon Coast when there is peak demand. Data collected for the city of Seattle, which has a similar climate to much of western Oregon, showed the average annual percent sunshine for the area is about 43 percent (NCDC n.d.). Data presented by the George Washington University Solar Institute (2009) estimated that the daily average for Seattle in December is 0.7 kWh per square meter (m^2). At that rate, hundreds of acres of solar collectors would be needed to supply adequate power for the Project.

[5] In a recent case, BPA blocked wind farm generators from gaining access to its power lines which BPA claimed were committed to carrying electricity generated by hydropower facilities.

Hydropower

Hydropower generates electricity from water stored behind dams and then run through turbines. Conventional hydropower in Oregon generates about 330,542,260 megawatt-hours (MWh), which represents about 58 percent of all the electricity produced in Oregon.

According to the Northwest Power and Conservation Council (2007), most feasible hydroelectric facilities have already been developed. New hydropower projects in the Pacific Northwest are estimated to yield 480 MW in additional electric capacity through 2025, but that new capacity would mainly replace older hydroelectric facilities that are retired.

The ODE recognizes that climate change may alter the runoff regime feeding water to the hydroelectric dams, which could result in less summer power in the future. Legal issues concerning the operation of the dams with regards to fisheries could also diminish hydropower generation (ODE 2008).

It is unlikely that new dams would be constructed in the future because of high development costs and environmental impacts. In fact, efforts are underway to remove some existing dams to restore habitat and fish passage.[6] Further, environmental scrutiny during the relicensing process for existing dams has, in some instances, resulted in increased release of water for fisheries, which has reduced their electric generation capacity. Thus, the development of additional hydropower resources is not considered to offer significant environmental benefits over the power generation portion of the proposed Project.

Tidal

Generation of electricity through conversion of ocean current, swell, wave action, tidal gradients, and thermal gradients is being successfully demonstrated around the world. Wave densities in Oregon are estimated to be capable of producing between 5 and 15 megawatts per mile of coastline. In January 2013, Oregon set the course for future wave energy development in waters of the state by adopting an amendment to the Territorial Sea Plan. This document identified four Renewable Energy Suitability Study areas.

However, the only wave energy project in Oregon state waters to begin the permitting phase was Ocean Power Technologies' (OPT) proposal about 2.5 miles off the coast of Reedsport. On August 13, 2012, OPT received a license from the FERC in P-12713 to develop this project. The proposal was to install 10 buoys in the wave park capable of generating a total of about 1.5 MW of electricity. In April 2014, OPT announced that it was dropping the project.[7] On May 30, 2014, OPT filed an application with the FERC to surrender its license.

There are now no permitted wave or tidal energy projects off the Oregon shore. Therefore, we do not consider tidal or wave energy would meet the electricity generating objectives of the Project.

[6] There are plans to remove four dams along the lower Klamath River as part of the FERC's relicensing review of PacificCorp's Klamath Hydroelectric Project in P-2082. See USDOI and CDFG (2012).
[7] Schwartz, D. 4 April 2014. "Oregon Wave Energy Project Sinks." *EarthFix*. Website: http://earthfix.opb.org/energy/article/oregon-wave-energy-project-sinks/.

3.4 PIPELINE ALTERNATIVES

We assessed whether it might be possible to significantly reduce environmental impacts associated with the construction and operation of the Pacific Connector pipeline by following alternative routes. We evaluated route alternatives raised during scoping by the public, or by federal land-managing agencies, that may avoid or minimize impacts on specific, localized resources such as mature forest habitat, waterbodies, wetlands, sensitive species, cultural resources, or residences. Lastly, we considered if there were alternative locations for aboveground facilities associated with the pipeline, such as the proposed compressor station, that would have lesser environmental impacts.

The "proposed route," discussed below in comparison to alternative routes, is the pipeline route filed by Pacific Connector in its June 2013 application to the FERC, as modified by supplemental filings thereafter up until the publication of this EIS. The proposed route is illustrated on maps contained in appendix C of this EIS.

3.4.1 Pipeline Alternative Routes Eliminated from Detailed Analyses

In the FERC May 2009 FEIS for the original sendout pipeline project in Docket No. CP07-441-000, we explained how Pacific Connector selected its route. Section 3.4.1 of that document discussed the Coos County Pipeline Alternative Route; Highway 42 Alternative Route; Powers Highway Alternative Route; Grants Pass Lateral Alternative Route; Cow Creek Alternative Route; Highway 138 Alternative Route; BPA Powerline Alternative Route; Highway 227 Alternative Route; Grants Pass to Medford Alternative Routes; Butte Falls Highway Alternative Route; Medford East Alternative Routes; and Klamath Falls East Alternative Routes. For the reasons given in the May 2009 FEIS, we eliminated those alternative routes from detailed analysis because they were unreasonable, infeasible, or unbuildable, and offered no significant environmental advantages over the proposed route. As stated in section 3.4.1 of the May 2009 FEIS, Pacific Connector reviewed more than 1,000 miles of alternative route segments, and selected its proposed route based on a number of factors, such as: minimization of the length of the pipeline; utilization of existing rights-of-way; avoidance of population centers; avoidance of known designated sensitive natural resource areas; recommendations from federal land managing agencies; avoidance of geological hazards; use of ridgelines; and construction feasibility and buildability.

Several commenters during scoping for the current Project in Docket No. CP13-492-000 proposed alternative routes that we considered but then eliminated from further analysis, as discussed below.

3.4.1.1 Straight Line Alternative Route

We received comments recommending that the pipeline route follow the shortest, most direct path, a straight line from Malin to Coos Bay.[8] This straight line alternative (figure 3.4-1) would be approximately 175 miles long compared to 232 miles for the proposed route. In theory, the shorter route would disturb approximately 650 acres less than the proposed route. However, this does not account for the additional workspaces required to cross steep terrain with unstable slopes in the Cascades and Coast Range.

[8] Comments during scoping recognized that there could be a straight line alternative that would be the optimum pipeline route for technical and economic reasons if environmental impacts and federal land use were not taken into consideration. See the letter from Ron Sadler dated October 15, 2012 and public testimony starting on page 31 of the transcript from the October 9, 2012 public scoping meeting in North Bend, Oregon.

The straight line route would require Congressional approval because it would cross the Mountain Lakes Wilderness and the Sky Lakes Wilderness. In addition the straight line route would cross directly through population centers at Altamont, Klamath Falls, and several towns, impacting many more homes and businesses than the proposed route. The straight line route would not offer significant environmental advantages over the proposed action and is not considered further in this analysis.

3.4.1.2 All Highway Alternative Route

During scoping, commenters made suggestions about possible route alternatives. One comment suggested the pipeline follow existing highways as much as possible.[9] This all-highway alternative would follow Highway 50 west from Malin, to Highway 39 northwest to Klamath Falls, then along Highway 140 west to Medford, then along I-5 north to Winston, then west along Highway 42, and then north along Highway 101 to Coos Bay (figure 3.4-1). This route would be approximately 281 miles long, which would be about 50 miles longer than the proposed route, resulting in approximately 600 acres of additional disturbance. Because the highways in southern Oregon cross through cities and towns, this route, and other possible routes sited along highways, would impact many more homes and businesses than the proposed route. An all-highway route would not offer significant environmental advantages over the proposed route and is not considered further in this analysis.

In addition, the Federal Highway Administration (FHWA) historically prohibited the installation of new utility facilities within the rights-of-way of access-controlled freeways except in some extraordinary cases. This prohibition was consistent with the American Association of State Highway Transportation Officials (AASHTO) policies for longitudinal accommodation. However, with a 1988 amendment to the FHWA regulations, the FHWA's policy changed to allow each state to decide whether to permit new utility facilities within these rights-of-way, or continue to adhere to the stricter AASHTO policies (FHWA 2013). Oregon defines its policy for accommodating utilities in highway rights-of-way in Oregon Administrative Rule 734-055-0080. In general, Oregon does not allow utilities to occupy interstate rights-of-way for longitudinal uses (Caswell 2008).

[9] See letter from Bill Gow, dated October 26, 2012, filed under Docket No. PF12-17-000, and his comments during public scoping meetings for the Pacific Connector Pipeline Project.

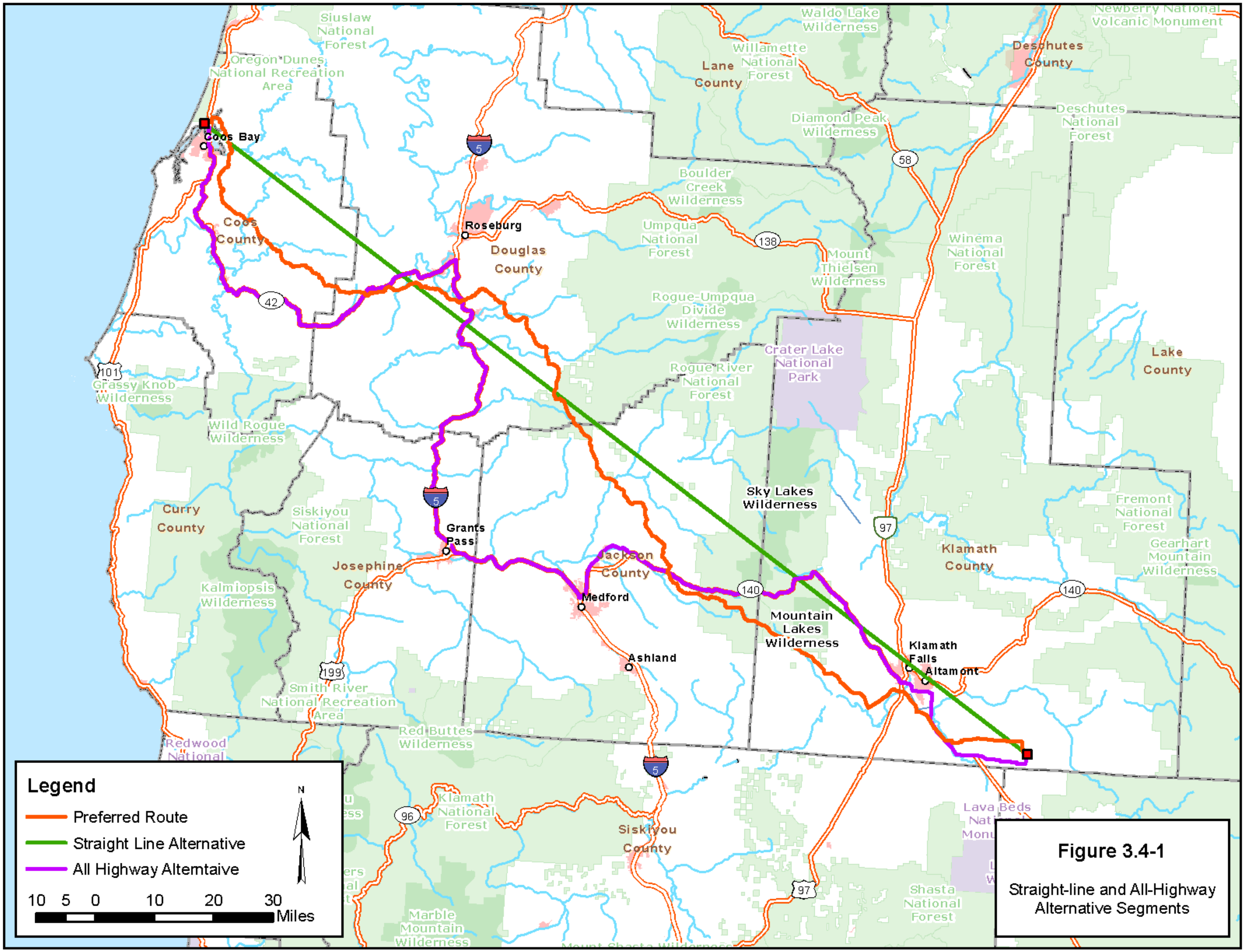


Figure 3.4-1
Straight-line and All-Highway Alternative Segments

3.4.1.3 Federal Land Route Alternative

We received a comment during scoping suggesting that the pipeline should be routed entirely on federal lands to avoid impacts on private property.[10] Given the patchwork nature of federal land holdings in southern Oregon, with federal blocks scattered between private tracts (see figure 3.4-1), we were unable to identify a route between Malin and Coos Bay that would not cross private lands. Therefore, a route that would be entirely on federal land and would avoid private property would be unrealistic and unfeasible, and is not considered further in this EIS.

3.4.1.4 Round Top Butte National Natural Landmark Route Alternative

The NPS requested that we consider an alternative route that would increase the distance between the pipeline and the Round Top Butte NNL boundary (also see the discussion in section 4.8.1.2 of this EIS). The proposed Pacific Connector pipeline route would pass within about one-quarter mile of the eastern boundary for the NNL near MP 135.3. At this location, the proposed pipeline route would be within a saddle or gap between Round Top Butte on the west and Obenchain Mountain on the east. Pacific Connector stated that to move the pipeline eastward away from the NNL boundary would put it on the steep slopes of Obenchain Mountain, which may create constructability issues. Further, the pipeline is currently routed over private lands outside of the NNL boundary that were recently harvested for timber. Relocating the pipeline to the east could affect five additional landowners, and result in the clearing of more forest. The BLM, which administers the land containing the Round Top Butte NNL, is a cooperating agency in the development of this EIS, has taken a role in the siting of the pipeline on its lands, and does not have any concerns about the proposed route in this area. Therefore, we conclude that the proposed route is environmentally preferable, and we did not do any further study of a reroute to increase the distance away from the Round Top Butte NNL.

3.4.1.5 West-wide Energy Corridor Routes (Section 368 Corridors)

Section 368 of the EPAct (42 U.S.C. 15926) directed the Secretaries of Agriculture, Commerce, Defense, and Energy to designate corridors for oil, gas, and hydrogen pipelines and electricity transmission facilities in 11 western states ("Section 368 Corridors"). The agencies prepared the *Final Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States* (DOE/EIS-0386) (PEIS) to evaluate the impacts of proposed Section 368 Corridors. In January of 2009, the Department of the Interior and the Department of Agriculture each issued a ROD that designated Section 368 Corridors over lands under their respective jurisdiction. The RODs contain Interagency Operating Procedures that are intended to, in part, provide practicable measures to avoid or minimize environmental harm from future development within the corridors.

On July 7, 2009, several non-profit organizations filed a lawsuit in the Northern District of California challenging the designation of the Section 368 energy corridors pursuant to the EPAct, NEPA, ESA, and the Administrative Procedure Act. The parties entered into a settlement agreement, which was approved on July 11, 2012.[11]

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[10] See for example, Dave Picanso comments at the public meeting in Klamath Falls on August 29, 2012, in transcripts filed under Docket No. PF12-17-000.

[11] *Wilderness Society v. United States Department of the Interior*, No. 3:09-cv-03048-JW (D. N.D. Cal). Information about the settlement agreement can be found at the following web address: http://corridoreis.anl.gov/.

The Pacific Connector pipeline would occupy a one-mile segment crossing lands managed by BLM identified as a corridor of concern in the settlement agreement. This corridor of concern was identified as Section 368 Corridor 4-247, approximately located between pipeline MPs 80 and 81. In its role as a cooperating agency, BLM has worked closely with the proponent on route locations. The FERC, the BLM, and the Forest Service hereby meet the notification requirements of the settlement agreement through publication of this draft EIS, and by having informed the proponent that a small segment of the proposed route is subject to the terms of the settlement agreement.

In this draft EIS, we considered the proposed use of the Section 368 Corridor segment 4-247 in accordance with BLM Instruction Memorandum 2014-080 "Policy Guidance for Use of Corridors Designated Pursuant to Section 368 of the Energy Policy Act of 2005 as Required by the Settlement Agreement in *Wilderness Society v. United States Department of the Interior*, No. 3:09-cv-03048-JW (D. N.D. Cal)." Specifically, this draft EIS addresses issues related to critical habitat for fish and wildlife species listed under the ESA, LSRs, and Riparian Reserves and management direction provided in the BLM Roseburg District LMP. The FERC and the BLM would consider the above information in their respective decisions regarding the proposed Project.

3.4.2 Pipeline Alternative Routes Analyzed in Detail

We studied a number of alternative pipeline route segments that were suggested by stakeholders, including landowners and agencies, or developed by the FERC staff. Route variations were identified in an effort to avoid or minimize potential impacts on specific localized resources. Each alternative route was compared to the corresponding segment of the proposed route using desktop data (such as maps or file searches). In some cases, Pacific Connector conducted on-the-ground studies of specific alternative routes. Elements we considered during these analyses included pipeline length, use of existing rights-of-way, forest land, agricultural land, waterbody and wetland crossings, residences, known cultural resources, habitat for federally listed threatened or endangered species, and geological hazards and slope stability. After the comparison, we determined if the alternative route had significant environmental advantages over the corresponding segment of proposed route. We also took into consideration if the alternative route was technically feasible or safely buildable. These alternative route segments are discussed below.

3.4.2.1 Brunschmid Wetland Reserve Program Easement Alternative Routes

In an August 30, 2012, letter to the FERC, the NRCS indicated that it had concerns regarding the potential negative impacts the Pacific Connector Pipeline Project may have on the operation and function of the 13.4 acres enrolled in the permanent conservation easement under the Wetland Reserve Program (WRP) on the Brunschmid property. The NRCS stated that its policy is that proposed projects should avoid impacts on WRP easements. Pacific Connector's proposed route in its June 2013 application to the FERC between about MPs 9.4R and 12.4R would avoid the Brunschmid WRP easements. We evaluated Pacific Connector's June 2013 proposed pipeline route to the equivalent portion of the May 2009 FEIS Route and Pacific Connector's Brunschmid-WRP1 Route. Figure 3.4-2 illustrates the proposed route and the alternatives, and environmental elements are compared in table 3.4.2.1-1.

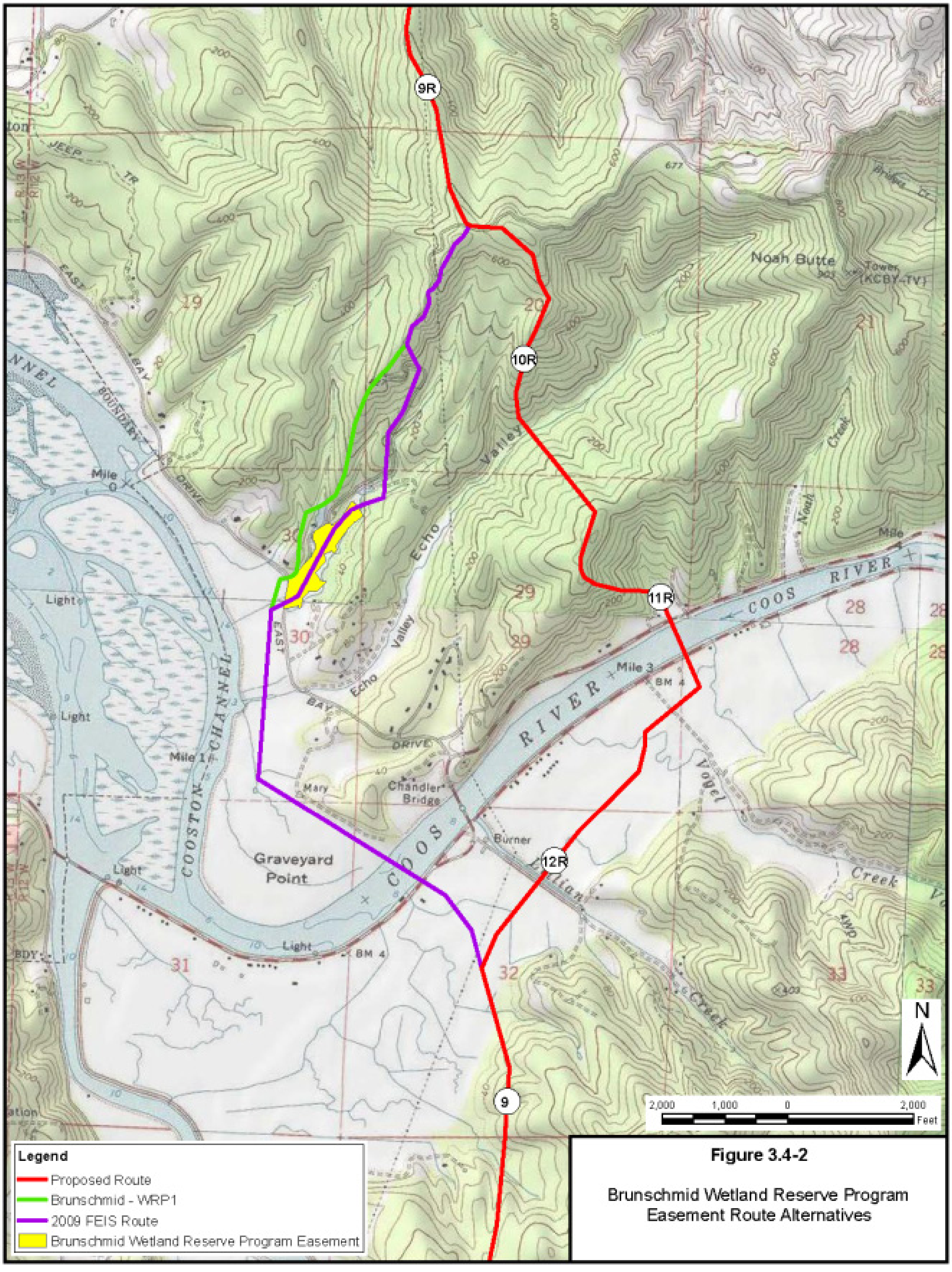

Figure 3.4-2

Brunschmid Wetland Reserve Program Easement Route Alternatives

TABLE 3.4.2.1-1

Comparison of the Proposed Route with the 2009 FEIS Route and Brunschmid WRP Easement Avoidance Alternative 1

Alternatives Analysis	2009 FEIS Route	WRP Avoidance Alternative 1	Proposed Route
Length (miles) a/	2.9 b/	2.8	3.0
Construction Right-of-Way (acres)	31	31	33
TEWAs (acres)	23	18	19
Permanent Easement (acres) c/	18	17	18
Number of Landowner Parcels Crossed (all private)	14	20	18
Number of Residences within 50 feet of Construction Right-of-Way	0	0	0
Number of Waterbodies Crossed	6 d/ Coos River and 1 ditch for HDD	7 d/ Coos River and 1 ditch for HDD	7 d/ Coos River to be HDD'd
Length of wetland crossings (feet)	9,082 e/,f/	4,417 f/	6,687 f/
Agricultural Lands Crossed (miles)	0.33 g/	0.33 g/	1.19 g/
Evergreen Forest (acres construction right-of-way)	4	8	14
Regenerating Forest clearing (acres construction right-of-way) h/	7	7	15
Habitat for threatened or endangered species	Coos River Southern DPS Green Sturgeon River – HDD	Directly affects known bald eagle nest i/ Coos River Southern DPS Green Sturgeon River – HDD	Coos River Southern DPS Green Sturgeon River – HDD
Number of Previously Recorded Cultural Resources	1	1	1
Number of Newly Identified Cultural Resources j/	0	0	0
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of alternative length)	0.8 (29.5 percent)	0.8 (27.1 percent)	0.5 (17.2 percent)
Avoids WRP Easement	No	Yes	Yes

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ Mileage length cannot be calculated by subtracting milepost ranges because of engineering station equations included in route segments between MPs 8.59 to 9.41R.
c/ Acres of permanent easement calculated based on crossing length on private and federal timber lands. Pacific Connector proposes a 50-foot permanent easement on federal lands and a 50-foot permanent easement on private timber lands.
d/ From review of Pacific Northwest Hydrography Framework Clearinghouse data layers (http://hydro.reo.gov/)
e/ Field surveys identified 5,902 feet.
f/ Based on NWI mapping. Waterbodies/ditches not separated out of extensive wetlands.
g/ Agricultural lands are associated with the Coos River Floodplain and included wetland pastures and hayfields.
h/ Includes recent clear-cut forests.
i/ ORBIC (2012). Nest site confirmed during Pacific Connector October 2012 over-flight route investigation.
j/ Surveys incomplete.

The May 2009 FEIS Alternative Route would directly impact the WRP easements on the Brunschmid property. The Brunschmid-WRP1 Alternative Route would avoid the WRP easements, going to the west of the easements. The Brunschmid-WRP1 Alternative Route would be slightly shorter than the proposed route; however, it would be in close proximity to an occupied bald eagle nest. While both the May 2009 FERC Alternative Route and the Brunschmid-WRP1 could use an HDD to cross under the Coos River, we are concerned about the potential for buried cultural resource deposits in the vicinity of Graveyard Point.[12]

Pacific Connector completed geotechnical borings along the proposed route in this area, which confirmed the feasibility of an HDD of the Coos River. The proposed route would avoid the WRP easements on the Brunschmid property (although it would affect other wetlands). It would also avoid the bald eagle nest along the Brunschmid-WRP-1 Alternative, Graveyard Point, and

[12] Site 35CS33 was recorded by Ron Stubbs in 1974 at Graveyard Point. Mark Tveskov (2007) wrote that the Graveyard Point Site "…documented an uninterrupted record of traditional household subsistence practices from over 1,300 years ago into the 20th century."

the community at the west end of Echo Valley. We conclude that the alternative routes would not offer significant environmental advantages over the proposed route.

3.4.2.2 Blue Ridge Alternative Routes

A group of landowners, calling themselves the 2013 Blue Ridge Alternative Route (BRAR13),[13] objected to the pipeline route filed with Pacific Connector's June 2013 application to the FERC between about MPs 11.1R and 21.8, in Coos County, and suggested that the FERC consider an alternative route. In our August 16, 2013, data request, we asked Pacific Connector to provide data comparing the June 2013 route with the Modified Blue Ridge 2013 Alternative Route that Pacific Connector developed after conferring with the BRAR13 group. Pacific Connector filed data about the alternative route on September 6 and 17, October 24, and November 1, 2013. The June 2013 proposed route and the Modified Blue Ridge 2013 Alternative Route are illustrated on figure 3.4-3 and compared in table 3.4.2.2-1. Figure 3.4-3 also shows a portion of the May 2009 FEIS route, and a Landowner Amended Route that was mostly incorporated into the Modified Blue Ridge 2013 Alternative Route, and is therefore not analyzed as a separate alternative.

The June 2013 proposed route would be slightly longer than the Modified Blue Ridge 2013 Alternative Route, and affect a greater number of landowners. The proposed route would cross more waterbodies and affect more habitat for federally listed fish species. Nearly 52 percent of the corresponding segment of the June 2013 proposed route would be co-located with a BPA powerline right-of-way, while 63 percent of the Modified Blue Ridge 2013 Alternative Route would parallel logging roads. The Modified Blue Ridge 2013 Alternative Route would affect nearly three times as many acres of LSOG forest, would cross one additional NSO home range, and cross more occupied MAMU stands compared to the proposed route.

Pacific Connector determined that both the proposed route and the Modified Blue Ridge 2013 Alternative Route are constructible. The Modified Blue Ridge 2013 Alternative Route would shift portions of the pipeline from land owned by private individuals and timber companies to federal land managed by the Coos Bay District of the BLM. However, a number of landowners along the Modified Blue Ridge 2013 Alternative Route object to it, believing that the alternative would affect the value of their properties, clear more forest including old growth, and impact wildlife and waterbodies, particularly Daniels Creek.[14] We conclude that the proposed route is environmentally preferable, because while temporary and short-term impacts on waterbodies and their associated aquatic resources crossed by the proposed route could be avoided, reduced, or mitigated by certain measures implemented by Pacific Connector, the additional crossings of LSOG forest and NSO and MAMU habitats along the Modified Blue Ridge 2013 Alternative would cause long-term impacts and an irretrievable loss of critical habitat that could not be easily mitigated. Therefore, the Modified Blue Ridge 2013 Alternative would not offer significant environmental advantages over the proposed route.

[13] See letters to the Commission filed on July 10, August 15, 16, 20, 22, and 30, September 25, October 29, and November 13, 2013, in Docket No. CP13-492-000.

[14] See letters from Cary Norman and Karen Dohler filed with the FERC on June 24, 2914, and letters from David Schmidt, Kathi Windsor, Tom Younker, Julie Eldridge, and Christine Keenan filed July 16, 2014, in Docket No. CP13-492-000.

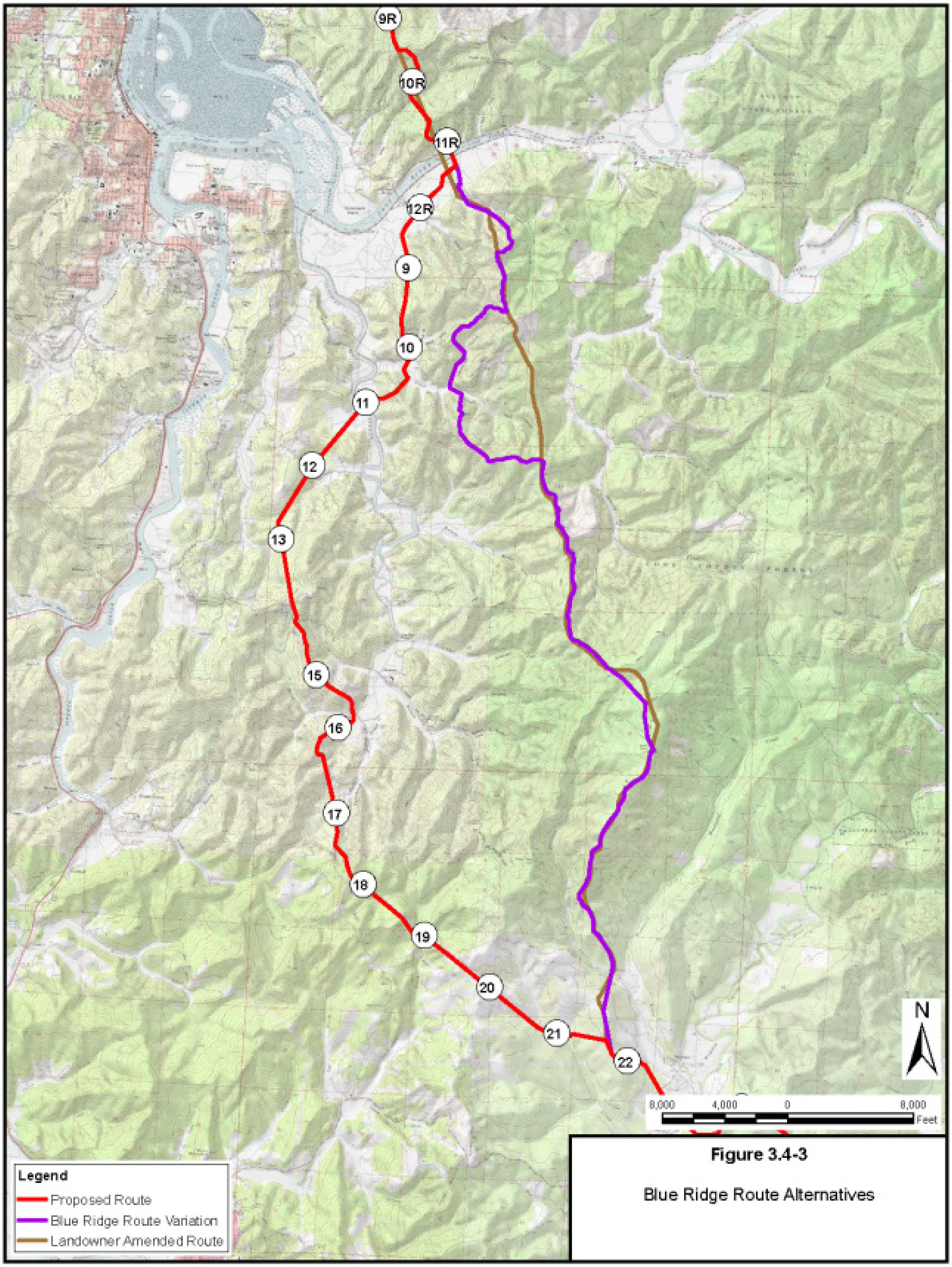

Figure 3.4-3

Blue Ridge Route Alternatives

TABLE 3.4.2.2-1

Comparison of Pacific Connector's Proposed Route with the Modified Blue Ridge 2013 Alternative

Impact/Issue		Proposed Route	Modified Blue Ridge Variation
Length (miles) a/		14.4	14.0
Construction right-of-way (acres)		166	162
Temporary extra work areas (TEWA) (acres)		68	39
Permanent easement (acres) b/		87.03	85.15
Land ownership (miles)	Private	12.93	6.46
	BLM	1.43	7.59
Number of landowner parcels crossed	Private	61	23
	BLM	4	11
Number of residences within 50 feet of the construction right-of-way		1	0
Water supply wells within 50 feet of the construction right-of-way c/		0	0
Number of waterbodies crossed		12 d/,e/	9 e/,
Length of wetland crossings (miles)		2.2 miles f/,g/	1.2 miles g/
Agricultural pastures affected (acres construction right-of-way) h/		43	22
Coniferous forest (acres construction right-of-way) i/	LSOG	6	17
	Mid-seral	49	42
	C – R	125	81
LSRs/Unmapped LSRs crossed (miles/acres)		0 miles / 0 acres	0.4 mile / 8 acres
Northern Spotted Owl (NSO) home range (1.5 mile radii)		1 NSO Home Range crossed (42310)	2 NSO Home Ranges crossed (42310 and P801G)
Marbled Murrelet (MAMU) stands intersected by the alignment		3 presumed occupied stands	3 occupied stands (C1027, C1040, C1042), 7 presumed occupied stands
Fish-bearing streams crossed j/	Known	6	5
Fisheries critical habitat (streams crossed)	Coho k/	9	4
	Green Sturgeon l/	4	0
Geologic hazards (number, feet) m/	Previously mapped: SLIDO, other published	4 slides, 7,137 feet	2 slides, 3,273 feet
	LiDAR identified	1 slide, 1,443 feet	2 slides, 1,097 feet
	Total	5 slides, 8,850 feet	4 slides, 4,370 feet
Number of known cultural resources sites		0	1 n/
Number of newly identified cultural resources		0	0 n/
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of route length) o/		7.4 (51.8 percent)	8.9 (63 percent)

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ Acres of permanent easement calculated based on a 50-foot permanent easement.
c/ OWRD (2013)
d/ Field surveys identified 41 perennial and 24 intermittent streams.
e/ From review of Pacific Northwest Hydrography Framework Clearinghouse data layers (http://hydro.reo.gov/).
f/ Field surveys. Identified 2.1 miles.
g/ Based on NWI mapping.
h/ Only acres associated with the construction right-of-way are provided for comparison, as TEWAs have not been designed for the Modified Blue Ridge Route Variation.
i/ Evergreen Forest: LSOG (late successional/old-growth forest) = 80+ years; Mid-seral = 40 to 80 years; C-R (Clear-cut/regenerating forest) = 0 to 40 years.
j/ ODFW (2012a)
k/ NMFS(2008a)
l/ NMFS (2009)
m/ See GeoEngineers (2013a).
n/ Surveys incomplete.
o/ Approximately 5.6 miles (39 percent) of the proposed route is co-located/adjacent to a BPA Powerline corridor, whereas the Modified Blue Ridge Route Variation is adjacent/co-located with logging roads.

3.4.2.3 Weaver Ridge Alternative Routes

The BLM requested that Pacific Connector consider route alternatives in the vicinity of Weaver Ridge between MPs 42.7 and 49.8 to avoid MAMU and NSO critical habitat. Several alternative routes were identified: Deep Creek Variation Alternative Route, the May 2009 FEIS Alternative

Route, Weaver Ridge Alternative 1 Route, Weaver Ridge Alternative 2 Route, Weaver Ridge Alternative 2a Route, Weaver Ridge Alternative 3 Route, Weaver Ridge Alternative 3a Route, and the proposed route. These routes are illustrated on figure 3.4-4 and compared in table 3.4.2.3-1.

The Weaver Ridge Alternative 1 Route would leave the proposed route around MP 46.0 crossing the logging spur road north of a reservoir and head almost due east on the north side of a tributary of Wildcat Creek over ridges, reconnecting with the proposed route at about MP 49.8. This alternative would be slightly shorter than the proposed route. However, the Weaver Ridge Alternative 1 Route would cross more miles of critical habitat for MAMU and NSO, and would cross two MAMU occupied stands (compared to one along the proposed route) and five NSO home ranges (compared to four along the proposed route).

The Weaver Ridge Alternative 2 Route would leave the Alternative 1 Route east of the proposed route at about MP 46, crossing a logging spur road, pass the Signal Tree Quarry, then follow Signal Tree Road for about 3 miles. It would head south over ridges, then join the Alternative 3 along Wildcat Creek. The Weaver Cove Alternative 2a Route would deviate from Alternative 2 just across the Coos County line along Signal Tree Road, cutting diagonally along Wildcat Creek to rejoin the Alternative 2 Route across the Douglas County line.

The Weaver Ridge Alternative 3 Route would leave the proposed route at about MP 42.6. It would follow ridges for about 3.5 miles, crossing Signal Tree Road and Upper Rock Creek. The alternative would then turn east and follow ridges for almost 4 miles, crossing Wildcat Creek before rejoining the proposed route at about MP 48.5. The Weaver Ridge Alternative 3a Route would leave Alternative 3 and follow Wildcat Creek for 1.5 miles to join the proposed route at about MP 49.0.

The Weaver Ridge Alternatives 2, 2a, 3, and 3a Routes are all longer than the proposed route and would cross more miles of MAMU and NSO critical habitat. Alternatives 3 and 3a would cross six NSO home ranges, while Alternatives 2 and 2a would cross five NSO home ranges (compared to four for the corresponding segment of proposed route). Compared to the proposed route, these alternatives would clear more LSOG and affect more acres of LSR on lands managed by the BLM. Therefore, those alternatives were eliminated from further consideration.

The May 2009 FEIS Alternative Route would leave the proposed route at about MP 46.3 and head southeast over ridges on the north side of Deep Creek, crossing the logging spur road south of the reservoir and reconnecting with the proposed route at about MP 48.0. The Deep Creek Variation Alternative Route would leave the proposed route at about MP 46.3 and follow a ridge north of Holmes Creek Spur Road and an unnamed four-wheel drive road back to the proposed route at about MP 47.0 and cross to the north side of the proposed route and parallel that route for about 1 mile before reconnecting with the proposed route near MP 48.0.

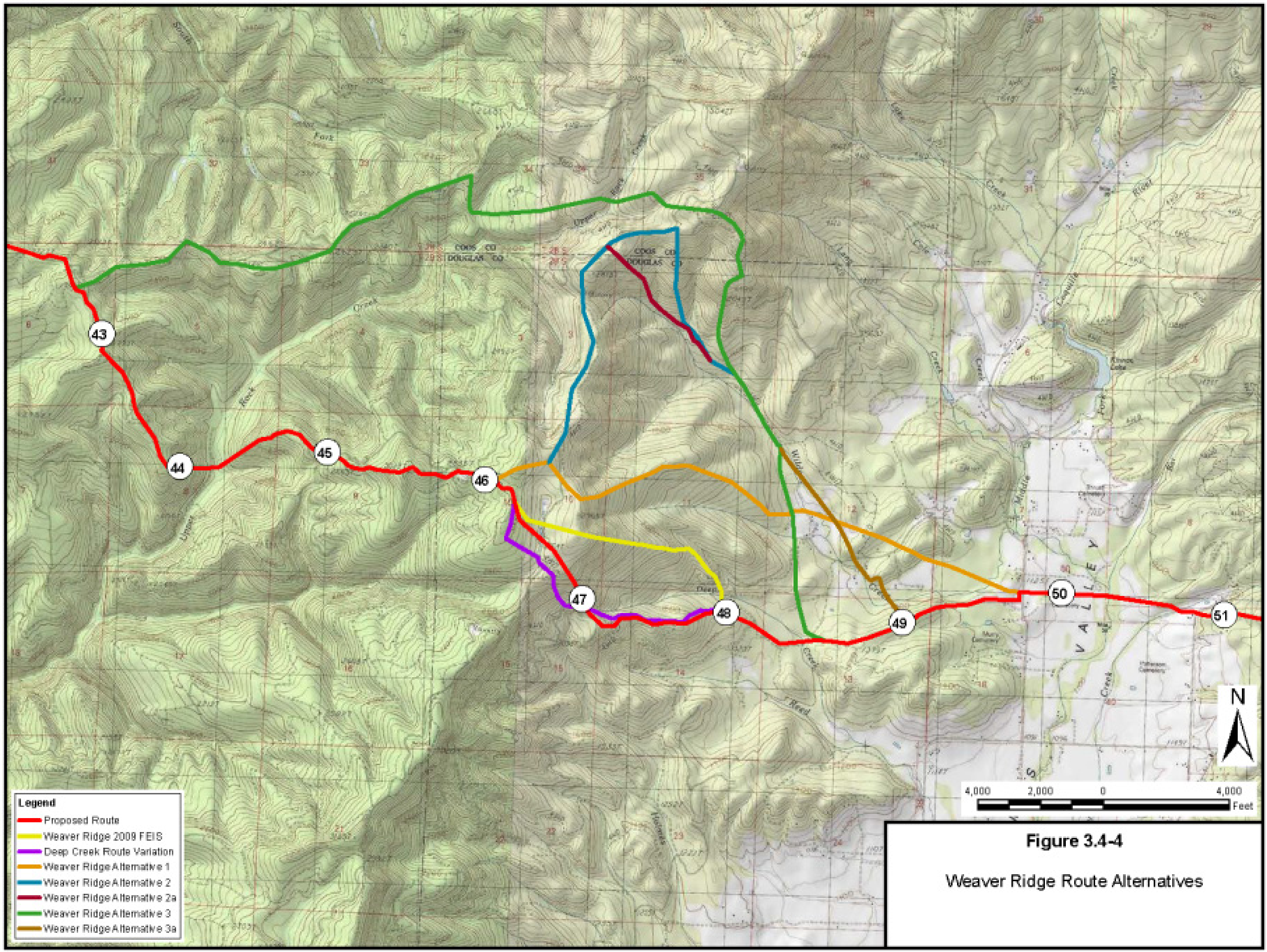

Figure 3.4-4

Weaver Ridge Route Alternatives

TABLE 3.4.2.3-1

Comparison of the Proposed Route with Weaver Ridge Alternative Routes

Alternatives Analysis		**Proposed Route**	**Deep Creek Route Variation**	**2009 FEIS Route**	**Weaver Ridge Alternative 1**	**2**	**2a**	**3**	**3a**
General									
Total length (miles) a/		7.3	7.4	7.2	7.0	9.3	9.0	8.6	8.2
Acres of construction right-of-way b/c/		84	85	82	80	107	103	99	94
Acres affected during operations (permanent easement) d/		44	45	43	42	56	54	53	50
Number of Parcels Affected	BLM	4	4	4	3	5	4	4	4
	Private	12	12	11	11	15	14	12	13
	State	0	0	0	0	0	0	0	0
Land ownership (miles)	BLM	2.7	2.8	3.3	2.5	3.4	2.8	3.6	3.2
	Private	4.6	4.6	3.9	4.5	6.0	6.2	5.0	5.0
	State	0	0	0	0	0	0	0	0
Waterbodies and Wetlands									
Number of waterbodies crossed e/		5	5	5	2	7	7	11	11
Total wetland crossing length (feet) f/		0	0	0	0	0	0	0	0
Land Use									
Land Allocations (miles)	Matrix	2.1	2.1	2.1	1.1	1.4	1.4	0.7	0.4
	LSR	0.6	0.7	1.2	1.4	1.9	1.4	2.9	2.9
	Riparian Reserves	0.5	0.7	0.5	<0.1	0.5	0.3	0.6	0.5
Evergreen forest, Mixed conifer (late successional/old-growth) (miles)		0.4	0.7	0.4	1.8	2.2	1.7	1.2	1.7
Regenerating/mid-seral forest (miles)		3.7	5.4	3.9	3.4	4.5	4.5	6.3	5.2
Total forest lands affected (miles)		6.0	7.1	5.9	6.3	8.5	8.1	8.0	7.4
Other land use types (miles)		1.3	0.3	1.3	0.7	0.8	0.8	0.7	0.8
Miles of right-of-way that would be parallel or adjacent to existing rights-of-way		3.2	3.8	3.6	2.4	3.6	3.2	2.7	2.3
Number of previously identified cultural resources along the route f/		0	0	0	1	0	0	0	0
Number of newly identified cultural resources along the route f/		0	0	0	0	0	0	0	0
Endangered Species									
Miles of marbled murrelet critical habitat crossed		0.6	0.7	1.2	1.4	2.0	1.4	2.9	2.9
Number of marbled murrelet occupied stands crossed		1	1	2	2	1	1	0	0
Miles of marbled murrelet occupied stands crossed		<0.1	<0.1	0.4	1.0	<0.1	<0.1	0	0
Miles of northern spotted owl critical habitat crossed		0.9	1.0	1.0	1.1	1.7	1.3	2.5	2.5
Number of northern spotted owl home ranges crossed		4	4	4	5	5	5	6	6

TABLE 3.4.2.3-1

Comparison of the Proposed Route with Weaver Ridge Alternative Routes

Alternatives Analysis	Proposed Route	Deep Creek Route Variation	2009 FEIS Route	Weaver Ridge Alternative 1	2	2a	3	3a
Miles of northern spotted owl home ranges crossed	5.9	6.0	5.8	6.0	8.1	7.8	7.3	7.0
Number of northern spotted owl 500-acre core areas crossed	1	1	0	1	2	2	2	2
Miles of northern spotted owl core areas crossed	0.6	0.6	0	1.1	1.4	1.0	1.9	1.9
Number of 30-acre nest patches crossed	0	0	0	1	1	0	0	0
Miles of 30-acre nest patches crossed	0	0	0	0.1	0.4	0	0	0

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ The construction right-of-way estimate for all route variations utilized 95 feet.
c/ TEWAs for all route variations have not been designed and are not included in the total acres of disturbance.
d/ The assumed permanent easement is 50 feet; however, Pacific Connector will only maintain vegetation within 15 feet of the pipeline centerline for a total of 30 feet in the long term.
e/ Waterbodies from PNW Hydrography Framework Clearinghouse.
f/ NWI CONUS data.

The Deep Creek Variation Alternative Route would be about 0.2 mile longer than the May 2009 FEIS Alternative Route, and cross one additional waterbody. Pacific Connector was concerned with the feasibility of this alternative. Based on a geotechnical review, the company indicated there would be a high risk of landslides and surface erosion where the Deep Creek Variation Alternative Route would cross the eastern flank of Weaver Ridge through convergent slopes above a first order stream. Pacific Connector also had concerns about the constructability of the May 2009 FEIS Alternative Route. Where that alternative would cross Weaver Ridge, it would traverse an extremely steep, narrow rock outcrop that would require blasting. So instead, the proposed route would ascend Weaver Ridge westward from a forest plantation near MP 46.5 up the slope to the north of the Deep Creek Variation Alternative Route, avoiding the rock outcrop.

The FERC staff agrees that the proposed route is environmentally preferable, because it would have the least impact on MAMU and NSO habitat, old-growth forest, and BLM LSR land allocations, and cross the fewest waterbodies, while being one of the most buildable alternatives, avoiding geological hazards and bedrock outcrops. We conclude that the alternative routes would not offer significant environmental advantage over the proposed route.

3.4.2.4 Camas Valley Alternative Routes

The BLM requested Pacific Connector consider route alternatives in the vicinity of the Camas Valley in Douglas County, Oregon to avoid MAMU habitat. Three route variations that cross the Camas Valley were identified: the 2007 Northern Alternative (or Variation) Route, the Camas Valley East Alternative Route, and the proposed route. These routes are illustrated on figure 3.4-5 and compared in table 3.4.2.4-1.

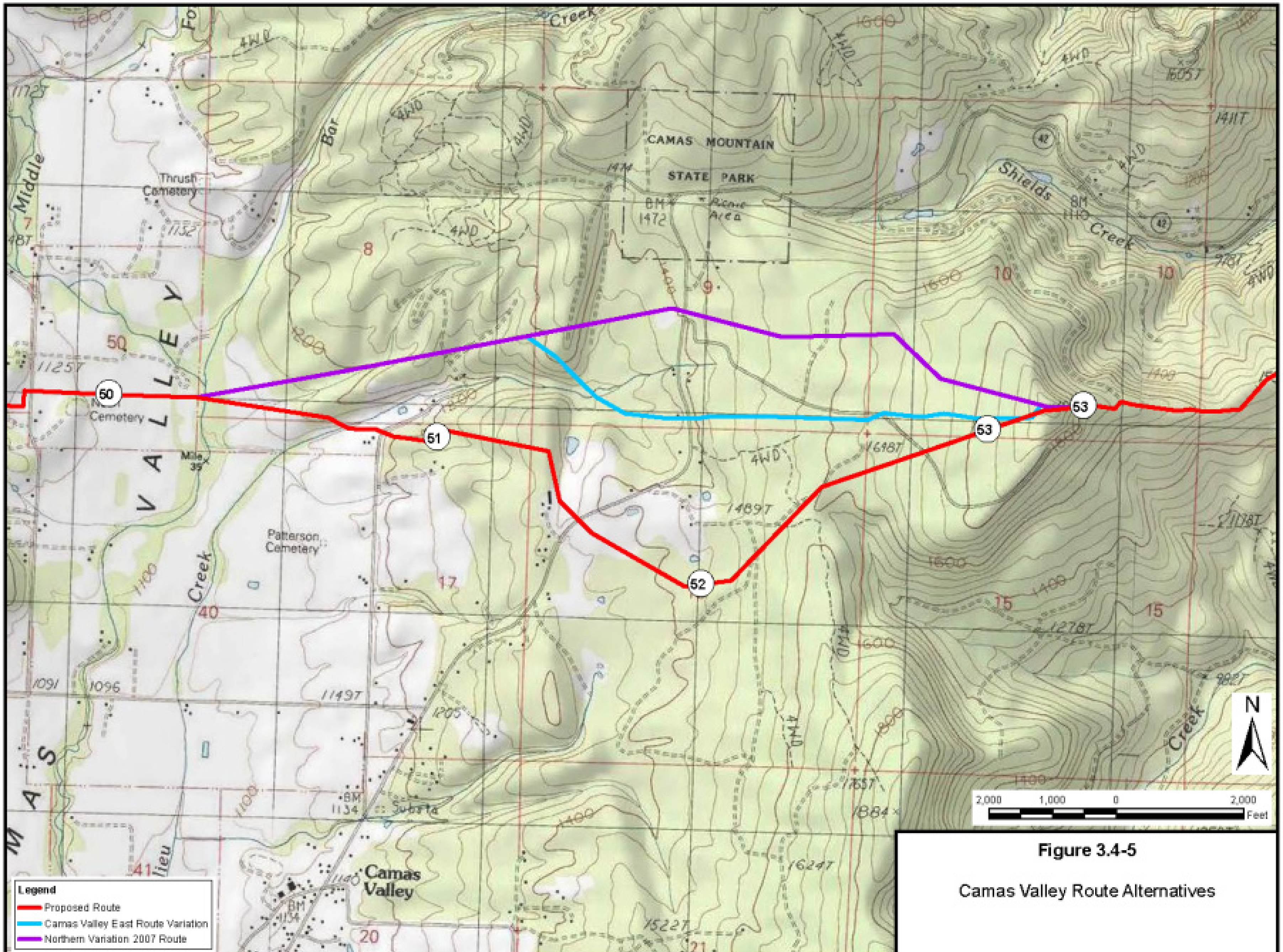

Figure 3.4-5

Camas Valley Route Alternatives

TABLE 3.4.2.4-1

Comparison of Camas Valley Alternatives with the Corresponding Segment of the Proposed Route

Alternatives Analysis		2007 Northern Alternative Route		Camas Valley East Alternative Route	Proposed Route
General					
Length (miles) a/		2.7		2.7	2.9
Construction right-of-way (acres)		31		32	33
Permanent easement (acres) b/		16		Estimated to be similar to Northern Variation	17
Land Use					
Land Ownership (miles)	Private	2.0		Similar to Northern Variation	2.3
	State	0		0	0
	Federal (BLM/NFS lands)	0.8		Similar to Northern Variation	0.6
Number of landowner parcels crossed		8		Unknown	15
Number of residences within 50 feet of construction right-of-way		0		1	0 c/
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of alternative length)		0.1		1.2	0.1
LSR - Federal land use designation (acres)		0		Unknown	5 d/
Riparian Reserves - federal land use designation (acres)		3		Unknown	1
Waterbodies and Wetlands					
Number of waterbodies crossed e/		11		3	4
Length of wetland crossings (feet) f/		0		0	0
Vegetation					
Agricultural lands affected (acres)		2		2	8
Total forest clearing (acres)		39		14	28
Acres Clearcut/Regenerating (0 to 40 years) g/		22		13	14
Acres Mid-Seral Forest (40 to 80 years)		10		Undetermined	8
Acres Late-Successional Forest (80 to 175 years)		2		Undetermined	6
Old-Growth Forest (175 +)		4		Undetermined	0
Biological Resources					
MAMU suitable habitat crossed (feet) h/		18		Unknown	5
MAMU stands	Occupied	Alignment crosses 1,043 feet of Occupied Stand R3027		Unknown	No known stands
	Presumed	Alignment crosses 350 feet of Potential MAMU Stand B12 that is not likely to be occupied based on the 2-year survey protocol.		Unknown	No known stands
MAMU critical habitat (acres)		0		Unknown	5 Pacific Connector made a minor adjusted to the Southern Route Variation to avoid crossing approximately 175 feet of the old-growth forest within this Critical Habitat Unit.)
NSO. suitable habitat crossed (acres) i/		33		Unknown	20
NSO. nest patch/cores		None		Unknown	No known nest patch/cores
NSO critical habitat crossed (feet)		0		Unknown	0
Habitat category(acres) j/	1		5	Unknown	2
	2		5	Unknown	13
	3		15	Unknown	17
	4		18	Unknown	16
	5		2	Unknown	2
	6		2	Unknown	3

TABLE 3.4.2.4-1

Comparison of Camas Valley Alternatives with the Corresponding Segment of the Proposed Route

Alternatives Analysis	2007 Northern Alternative Route	Camas Valley East Alternative Route	Proposed Route
Kincaid's lupine	Approximately 2.2 miles of potential habitat crossed; 0.8 mile surveyed of which 0.3 mile was considered suitable; no plants located in 2007.	Unknown	Approximately 1.1 miles of habitat may be suitable for Kincaid's lupine.
ESA fish species present/habitat k/	1 stream crossing known, 3 stream crossings unknown. 1 stream crossing - Oregon Coast ESU Coho, assumed.	Unknown	1 stream crossing known, 3 stream crossings unknown. 1 stream crossing - Oregon Coast ESU Coho, assumed.
StreamNet – anadromous fish distribution l/	None	None	None
Geotechnical			
Steep or difficult terrain (miles) m/	0.0	Unknown	0.0
Highly erosive soils (miles) n/	0.2	Unknown	0.2
Cultural Resources			
Number of previously recorded cultural resources	3 - Isolated finds; 2- sites	1 site	2 sites
Number of newly identified cultural resources o/	N/A	Unknown	1- isolated find

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ Acres of permanent easement calculated based on a 50-foot width.
c/ There are 2 outbuilding structures (barns/sheds) in the vicinity of the Southern Route Alternative. that are within 50 feet of the construction right-of-way (MP 51.4 and MP 51.9). Neither of these structures is suspected of being residences; however, during the right-of-way acquisition phase, Pacific Connector would attempt to locate the construction right-of-way 50 feet from any residences, where feasible.
d/ A total of approximately 5 acres of federal LSR would be affected, with 3 acres occurring within clear- cut/regenerating forests (0 to 40 years) and 2 acres occurring within mid-seral forest (40 to 80 years).
e/ Waterbodies from PNW Hydrography Framework Clearinghouse.
f/ NWI CONUS data.
g/ Forest Age Classes: Includes recent clearcut forests and areas of inroad construction where forest clearing would be reduced.
h/ Huff et al. (2006)
i/ Forest Service (2005a)
j/ See Section 3.4.1.4 of Pacific Connector's Resource Report 3 filed with its September 2007 application to the FERC.
k/ FWS, NMFS, and StreamNet (http://www.streamnet.org).
l/ ODFW (2000a, 2006a); StreamNet.
m/ Based on Soil Mapping Units that have slopes of 50-75 percent and have a water erosion rating of high or severe (NRCS 2004).
n/ Based on Soil Mapping Units that have a water erosion rating of high or severe (NRCS 2004).
o/ The new proposed route would avoid one site and three isolated finds on the Northern Alternative. One site would be affected regardless of the route selection. This route was not completely surveyed.

The Northern Alternative Route would leave the proposed route at about MP 50.2 and head northeast across the Camas Valley then turn southeast over forested hills before it rejoins the proposed route near MP 53.0. This alternative route would cross habitat and one occupied stand for MAMU and habitat for NSO, and the BLM found it unacceptable.

The BLM suggested the Camas Valley East Alternative Route, which would follow the Northern Alternative for about 1 mile. It would leave the Northern Alternative Route and head southeast for about 0.4 mile. It would then turn east and follow the section line for about 1.2 miles before reconnecting with the proposed route just west of MP 53.0, east of the Camas Valley. Pacific Connector determined that the Oregon State Highway 42 crossing location along BLM's Camas Valley East Alternative Route was unacceptable for engineering design and safety reasons. The highway crossing along this alternative would be at the midpoint of a mile-long section of highway fill approximately 80 feet deep. The alternative pipeline route would also cross a tributary to Jim Bilieu Creek that flows beneath the highway in a culvert. Between Highway 42 and Quiet Mountain Road there is a rocky outcropping with numerous seeps and springs. The water appears to be collected and utilized by the nearby landowners for various uses. The severe elevation change from one side of the highway to the other, residences, water sources, powerline, and the presence of fill and rock collectively renders the alternative highway crossing virtually non-constructible.

The proposed route includes a highway crossing location that Pacific Connector states is constructible, and avoids an occupied MAMU stand. Pacific Connector proposes to cross under Highway 42 along the proposed route where it is essentially level using conventional boring methods. Both sides of the highway crossing are only lightly vegetated which would minimize visual impact of the pipeline right-of-way from motorists traveling along Highway 42.

The proposed route is approximately 0.2 mile longer than the Northern Alternative Route. Based on evaluation of the Pacific Northwest Hydrography Framework Clearinghouse data layers, the proposed route would cross 4 waterbodies compared to 11 for the Northern Alternative Route, and would require the clearing of less forest. The FERC staff and BLM agree that neither the 2007 Northern Variation nor the Camas Valley East Alternative Route offer significant environmental advantage over the proposed route between MPs 50.2 and 53.0.

3.4.2.5 Interstate 5 and South Umpqua River Crossing Alternative Routes

Pacific Connector investigated various alternative routes to cross I-5 and the South Umpqua River between about MPs 67.4 and 74.8 in Douglas County, south of the city of Roseburg due to concerns raised during scoping. The various routes are illustrated on figure 3.4-6 and are compared on table 3.4.2.5-1.

The route analyzed in the FERC's May 2009 FEIS in Docket No. CP07-441-000 (May 2009 FEIS Alternative Route) had constructability and environmental issues. Pacific Connector had proposed to use a bore to cross under I-5 along the May 2009 FEIS Alternative Route, but concerns were raised due to uncertain subsurface conditions associated with the extended crossing length (approximately 400 feet) and unknown types of fill material. Additional considerations include removal of approximately 40 feet of overburden material on the west side of I-5 to construct a bore pit, and un-useable workspace conditions due to steep side slopes on both sides of I-5 at the alternative route crossing location. Pacific Connector had originally proposed to use a diverted open cut for the western crossing of the South Umpqua River along the May 2009 FEIS Alternative Route, but concerns were raised about impacts that crossing method may have on federally listed fish species. In addition, a bald eagle nest was found near the crossing location that would have delayed construction during the breeding season, conflicting with the ODFW water crossing window.

Also along the May 2009 FEIS Alternative Route, the pipeline would be near a recently developed subdivision on property owned by Marc and Dea McConnell. Pacific Connector created the MP 69.7 Alternative Route that would go on the north side of the McConnell property from the original location of the proposed Clarks Branch Meter Station eastward to cross I-5. This alternative route would move the bore under I-5 approximately 350 feet to the northwest. However, that alternative would still cross one of the developed lots and one of the undeveloped lots, and would be within 50 feet of five residences. Although this modification would result in a slightly shorter bore under I-5, and eliminate the need to remove excessive amounts of overburden at the bore pit location, the MP 69.7 Alternative Route would involve additional affected landowners and would not address risks associated with highway fill material and steep slopes at the crossing.

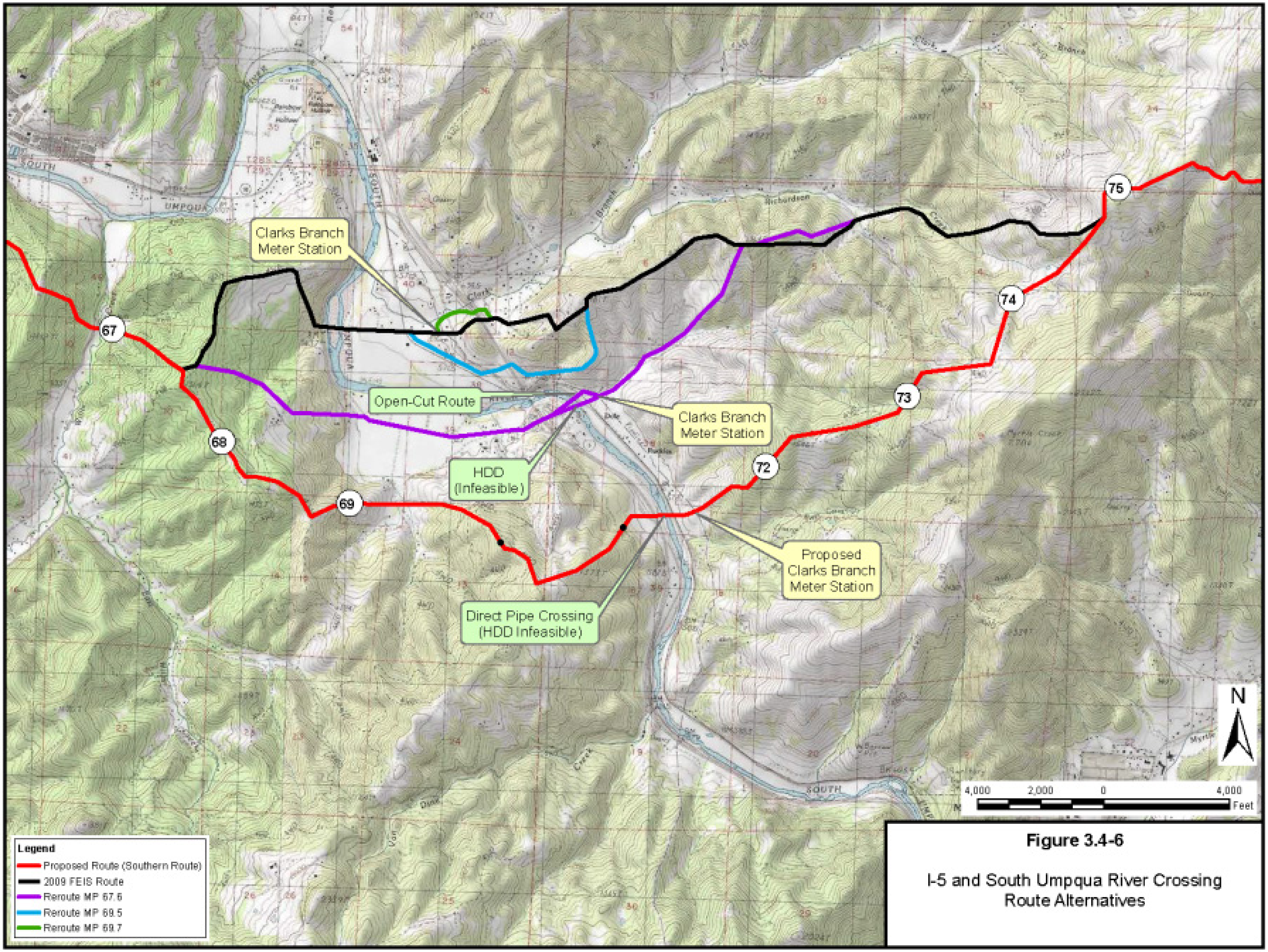

Figure 3.4-6

I-5 and South Umpqua River Crossing Route Alternatives

TABLE 3.4.2.5-1

Comparison of I-5 Alternative Routes to the Proposed Route

Alternatives Analysis		**May 2009 FEIS Route Alternative**	**MP 69.7 Route Alternative**	**MP 69.5 Route Alternative**	**MP 67.6 Route Alternative**	**Proposed Route**
General						
Total length (miles) a/		6.6	6.6	6.8	6.2	7.3
Acres of construction right-of-way b/		76	76	79	72	82
Total acres of construction disturbance		148	Not designed c/	Not designed c/	121	106
Acres affected during operations (permanent easement) d/		40	40	41	38	44
South Umpqua River Crossing Method		Diverted open cut	Diverted open cut	Diverted open cut	Open cut	DP technology
Landowner parcels crossed e/		39	35	27	28	26
Number of residences within 50 feet of construction right-of-way		7	5	1	0	0
Land ownership (miles)	Private	5.7	5.7	4.9	4.3	7.1
	State	0.3	0.3	0.3	0.4	0.2
	Federal (BLM/NFS Lands)	0.0	0.0	0.0	0.0	0.0
	Tribal	0.6	0.6	1.6	1.5	0.0
Waterbodies and Wetlands f/						
Number of waterbodies crossed		13	13	14	19	18
Total wetland crossing length (feet)		644	0	0	741	959
Land Use						
Agricultural land (including pastures) affected (miles)		0.6	0.5	0.8	1.1	0.1
Forest lands affected (miles) g/		1.5	1.5	1.4	1.6	3.7
Miles of right-of-way that would be parallel or adjacent to existing rights-of-way		3.5	3.4	2.5	3.0	1.6
Number of previously identified cultural resources along route		0	0	0	0	0
Number of newly identified cultural resources along route h/		3	1	1	0	0
Critical Habitat						
The coho salmon – Oregon Coast ESU – including designated CHU.		Present - South Umpqua River	Present - South Umpqua River	Present - South Umpqua River	Present - South Umpqua River	Present - South Umpqua River
Bald eagle nest within 0.25-mile		Present	Present	Unknown	Unknown	Unknown

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ The construction right-of-way for the preferred route and original proposed alignment is 95 feet.
c/ TEWAs for the various potential I-5 reroutes have not been designed and are not included in the total acres of disturbance. Pacific Connector assumes that the need for these TEWAs would be similar to the proposed route.
d/ The permanent easement for the proposed route and potential I-5 reroutes is 50 feet.
e/ Douglas County Assessor's Office (2011)
f/ Waterbodies and wetlands were obtained from the Hydrography Framework Clearinghouse and review of aerial photos. NWI mapping is not available for this area.
g/ Includes all forestland types and age classes; Mixed conifer, Deciduous forest.
h/ Surveys completed along proposed route; survey incomplete on reroutes.

The MP 69.5 Alternative Route would go south of the McConnell property to avoid the residential development. This alternative route would still be within 50 feet of one residence. It would cross I-5 in an area where Pacific Connector believed it could put in a bore. This alignment would require a relocation of the proposed Clarks Branch Meter Station. Both the MP 69.7 Alternative Route and the MP 69.5 Alternative Route would use the same diverted open cut crossing of the South Umpqua River at the location along the May 2009 FERC Alternative

Route; and therefore would also be within one-quarter mile of the occupied bald eagle nest. The MP 69.5 Alternative Route would be slightly longer than either the May 2009 FERC Alternative Route and the MP 69.7 Alternative Route, and would cross land owned by the Cow Creek Tribe.

It was Pacific Connector's preference to cross under both I-5 and the South Umpqua River using a single HDD, or cross I-5 with a bore where the slopes were not steep and highway fill would not be so great. Therefore, the applicant examined another crossing location along the MP 67.6 Alternative Route. The MP 67.6 Alternative Route would leave the May 2009 FEIS Alternative Route at about MP 67.6 heading southeast down a hill and then follow Old Highway 99 east for about 1 mile. It would cross I-5, the South Umpqua River, Dole Road, and a railroad before rejoining the May FEIS Alternative Route along Richardson Ridge at about MP 72.6. Because of the immediate proximity of Dole Road along the steep abrupt east bank of the river, it would be necessary to temporarily close the road to complete the river crossing. Old Highway 99 may also have to be temporarily closed to traffic during installation of the pipeline along the MP 67.6 Alternative Route.

Pacific Connector completed geotechnical investigations along MP 67.6 Alternative Route and determined that an HDD under I-5, the river, and the railroad would not be feasible because of the unfavorable geologic conditions. An open-cut crossing of the South Umpqua River would be required along the MP 67.6 Alternative Route because a diverted open-cut crossing at that location would be problematic for the following reasons:

- narrow gravel bar in the river would limit the diversion channel;
- shallow bedrock in upstream part of the gravel bar may require blasting;
- bar may have subsurface water flows;
- upstream and downstream elevation changes may require greater excavation and larger spoil storage areas; and
- longer in-water work associated with construction of temporary diversion dams and restoration of the diversion channel.

In 2013, Pacific Connector investigated a southern route that would have a less difficult crossing of I-5 and the South Umpqua River using a different technological method, and incorporated this change into the proposed route filed with its application to the FERC in Docket No. CP13-492-000. The proposed route would leave the May 2009 FEIS Alternative Route at about MP 67.6 and head southeast over upland ridgelines, turning due east for about a mile between MPs 69.0 and 70.0, then turn northeast from Edies Land at MP 70.5 to Highway 99 at MP 71.1. Because subsurface conditions would not allow for a HDD along the proposed route, Pacific Connector would use DP technology to cross under I-5, the South Umpqua River, Dole Road, and a railroad to MP 71.4. DP technology can overcome the problematic issues associated with the HDD crossing method because it provides a continuously supported hole during the excavation process, reduces the pressure of drilling mud, and eliminates the bore hole reaming and pull back requirements of an HDD. The Clarks Branch Meter Station would be moved to a pasture on the east side of the railroad where Northwest's Grants Pass Lateral is located near MP 71.5. The proposed route would continue northeast from the meter station following upland ridges to rejoin the May 2009 FEIS Alternative Route at about MP 74.8, along a private road south of the head of Clark Branch.

The proposed route would avoid residential areas as well as the pastures and croplands crossed by the MP 67.6 Alternative Route. It offers the best crossings of I-5 and the South Umpqua

River, and avoids the steep side slopes found along the May 2009 FEIS Alternative Route. The relocation of the Clarks Branch Meter Station to MP 71.5 on the proposed route would avoid the need for permanent wetland fill at the meter station location along the May 2009 FEIS Alternative Route. We conclude that none of the alternative routes would offer significant environmental advantages over the proposed route between MPs 67.4 and 74.8.

3.4.2.6 Northern Spotted Owl Nest Patch Alternative Routes

The BLM asked Pacific Connector to revise its 2009 route in order to avoid LSOG and a NSO nest patch. The pipeline route analyzed in the FERC's May 2009 FEIS for Docket No CP07-441-000 crossed an NSO nest patch between about MPs 81.2 and 82.5, east of South Myrtle Creek in Douglas County. Pacific Connector modified its pipeline alignment to avoid the NSO nest patch in its June 2013 application to the FERC in Docket No. CP13-493-000. These two routes are compared in table 3.4.2.6-1 and illustrated in figure 3.4-7.

The proposed route would be co-located with a recently constructed logging road, and routed through recently harvested forest. The May 2009 FEIS Alternative Route would cross less private land, including agricultural land. However, the proposed route would reduce impacts on LSOG forest and avoid the NSO nest patch. Therefore, we conclude that the May 2009 FEIS Alternative Route would not offer significant environmental advantage over the proposed route between MPs 81.2 and 82.5.

TABLE 3.4.2.6-1

Comparison of the May 2009 FERC FEIS Route Alternative With the Proposed Route Between MPs 81.2 and 82.5

Impact/Issue		May 2009 FEIS Route Alternative	Proposed Route
Total length (miles) a/		1.3	1.3
Acres of construction right-of-way		15	15
Acres of TEWAs		11	9
Permanent easement (acres) b/		8	8
Number of landowner parcels crossed		4	3
Land ownership (miles):	Private	0.6	1.3
	State	0.0	0.0
	Federal (BLM/NFS lands)	0.7	0.0
Number of residences within 50 feet of construction right-of-way		0	0
Geotechnical constraints		0	0
Number of waterbodies crossed c/		1	1
Total waterbody crossing length (feet)		2	2
Number of wetlands crossed		0	0
Total wetland crossing length (feet)		0	0
Agricultural land affected (acres)		<1	<1
Forest lands cleared (miles) d/		1.1	0.7
Forest cleared LSOG (miles)		0.7	0.0
Number of NSO nest patches crossed		1	0
Number of previously identified cultural resources along route		3	0
Number of newly identified cultural resources along route		0	0
Miles of right-of-way that would be parallel or adjacent to existing rights-of-way		1.0	1.0

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Mileage length cannot be calculated by subtracting milepost ranges because of engineering station equations included in route segment between MPs 9.41R to 8.59. Route Alternative lengths also cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ Acres of permanent easement calculated based on crossing length on private and federal timber lands. Pacific Connector proposes a 50-foot permanent easement on both federal and private lands.
c/ From Pacific Northwest Hydrography Framework Clearinghouse data layers (http://hydro.reo.gov/) and review of aerial photography and review of NWI mapping.
d/ Includes recent clear-cut forests and areas of inroad construction where forest clearing would be reduced.

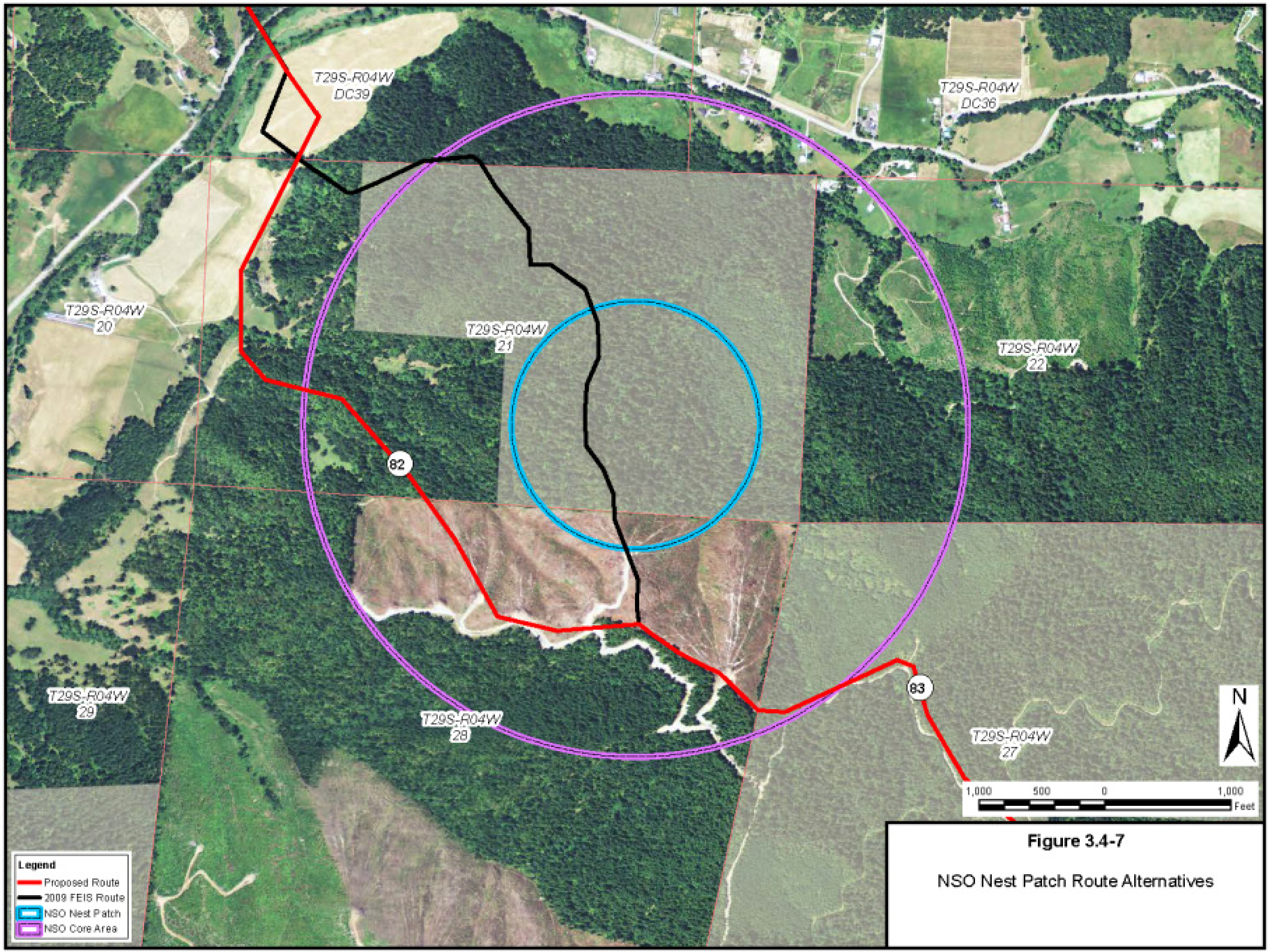

Figure 3.4-7

NSO Nest Patch Route Alternatives

3.4.2.7 Oregon Women's Land Trust Alternative Routes

In response to objections raised by the Oregon Women's Land Trust about the 2007 pipeline route across its property, Pacific Connector adjusted its proposed route between about MPs 85.4 and 87.0. Table 3.4.2.7-1 compares the 2007 Alternative Route to the proposed route; both routes are illustrated on figure 3.4-8.

The 2007 Alternative Route would be approximately 50 feet from a guest house. The proposed route avoids this house and minimizes the overall crossing of Trust-owned lands. Other environmental advantages of the proposed route include following an existing right-of-way for 0.4 mile and avoiding crossing tributaries to Wood Creek. However, the 2007 Alternative Route would be shorter, affect two fewer landowners, clear fewer acres of forest, and avoid an historic NSO activity center.

In an October 27, 2012, letter to the Commission, the Oregon Women's Land Trust stated that it found both routes objectionable. When evaluating alternatives, sometimes tradeoffs between resources have to be considered. In this situation, we are weighting impacts on natural resources against impacts on a residence. While we acknowledge that the 2007 Alternative Route would impact less forest, we conclude that the proposed route would result in the least amount of impact on the Oregon Women's Land Trust property, would avoid impacts on a residence, and would avoid crossing any waterbodies. Therefore, we found that the 2007 Alternative Route would not offer significant environmental advantages over the proposed route between MPs 85.4 and 87.0.

TABLE 3.4.2.7-1

Comparison of Alternative Routes Across the Oregon Women's Land Trust Property

Alternatives Analysis		2007 Route Alternative	Proposed Route
General			
Length (miles) a/		1.4	2.0
Construction right-of-way (acres)		16	22
Number of TEWAs		10	6
Acres of TEWAs		5	2
Permanent easement (acres) b/		8	10
Land Use			
Land Ownership (miles)	Private	1.2	1.5
	State	0.0	0.0
	Federal (BLM/NFS Lands)	0.2	0.5
Number of landowner parcels crossed		6	8
Number of residences within 50 feet of construction right-of-way		1	0
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of alternative length)		0.0 (0 percent)	0.4 (21 percent)
Waterbodies and Wetlands			
Number waterbodies crossed d/		3 c/	0
Length of wetland crossings (feet) e/		0	0
Vegetation			
Total forest clearing (acres)		20	25
Acres Clearcut/Regenerating (0 to 40 years)		5	4
Acres Mid-Seral Forest (40 to 80 years)		2	<1
Acres Late-Successional Forest (80 to 175 years)		9	15
Acres Old-Growth Forest (175 +)		4	5
Biological Resources			
Northern spotted owl. suitable habitat crossed (acres) f/		19	24
Northern spotted owl nest patch/cores		1	1
Northern spotted owl critical habitat crossed (feet)		0	0

TABLE 3.4.2.7-1

Comparison of Alternative Routes Across the Oregon Women's Land Trust Property

Alternatives Analysis		2007 Route Alternative	Proposed Route
Habitat category (acres) g/	1	4	7
	2	9	13
	3	7	5
	4	0	0
	5	0	0
	6	<1	<1
ESA fish species present / habitat h/		1 stream Oregon Coast ESU Coho, assumed habitat T, CH	None
StreamNet – anadromous fish distribution i/		1 stream – assumed	None
Geotechnical			
Steep or difficult terrain (miles) j/		0.0	0.0
Highly erosive soils (miles) k/		0.9	1.4

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ Acres of permanent easement calculated based on a 50-foot width.
c/ Field surveys identified 2 streams.
d/ Pacific Northwest Hydrography Framework Clearinghouse data layers (http://hydro.reo.gov/).
e/ From NWI mapping - access was denied on the majority of the parcels crossed by this route.
f/ Forest Service (2005a).
g/ See description in Pacific Connector's Resource Report 3 in its June 2013 application.
h/ FWS, NMFS, and StreamNet (http://www.streamnet.org).
i/ ODFW 2000a, 2006a; StreamNet.
j/ Based on Soil Mapping Units that have slopes of 50 to 75 percent and have a water erosion rating of high or severe (NRCS 2004).
k/ Based on Soil Mapping Units that have a water erosion rating of high or severe (NRCS 2004).

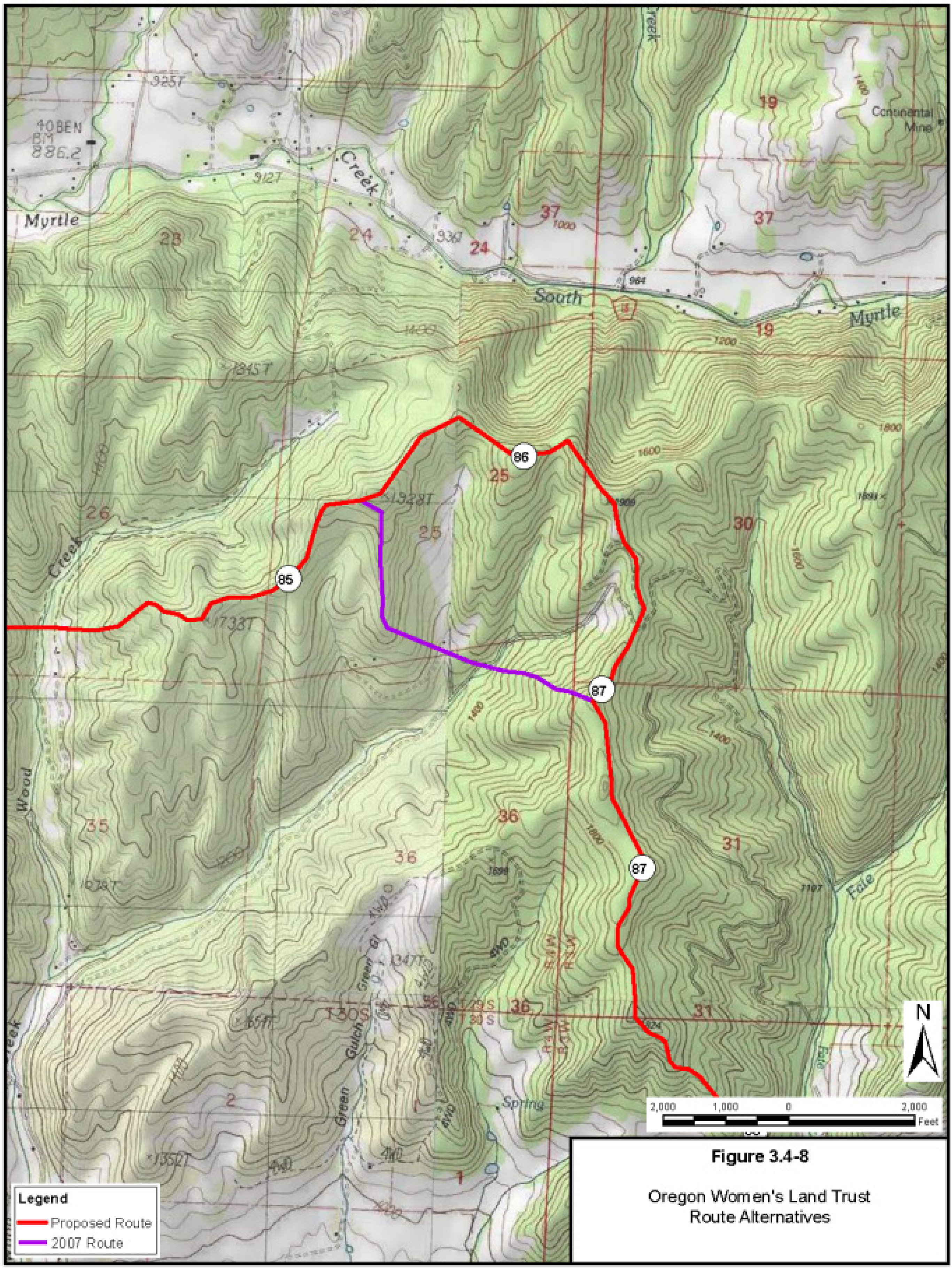

Figure 3.4-8

Oregon Women's Land Trust
Route Alternatives

3.4.2.8 Umpqua National Forest – Neuman Gap to Long Prairie Alternative Routes

The Forest Service requested the consideration of alternative routes within the Umpqua National Forest, along Wildcat Ridge between Neuman Gap near MP 105 and Long Prairie near MP 111. We compared the proposed route to three alternatives routes: the May 2006 Alternative Route (Alternative 1); the Forest Service Road 3200 Alternative Route (Alternative 2); and the Compromise Alternative Route (Alternative 3). The proposed route and alternative routes in this area are shown on figure 3.4-9, and table 3.4.2.8-1 includes a comparison of environmental variables between the alternative routes and the corresponding segment of proposed route.

The Forest Service and the Cow Creek Tribe indicated that a segment of the pipeline route originally proposed by Pacific Connector in May 2006 had the potential to impact an important traditional cultural property. The Forest Service also raised issues related to the crossing of an LSR. Based on these objections, we do not recommend use of the May 2006 Alternative Route (Alternative 1).

The Forest Service suggested a different alternative route that would follow existing Forest Service Road 3200 (Alternative 2). The rationale for this alternative was to utilize the existing cleared road corridor to minimize forest fragmentation and reduce impacts on LSRs. We also do not recommend use of the Forest Road 3200 Alternative Route Variation, because of Pacific Connector's concerns about its constructability, including:

- There is a high risk of landslide occurrence from Forest Service Road #3200, headwall swales and from constructed fill slopes that would be completed during construction;
- Earthwork necessary for a 95-foot construction corridor on side slopes exceeding 70 percent along the route is considered infeasible due to geotechnical considerations;
- Steep side slopes (greater than 50 percent) require significant excavations to construct a 95-foot construction corridor. Based on anticipated range of excavation of between 0.5:1 (horizontal:vertical) and 1:1, the cutslope would be between approximately 100 to 135 feet in height. The excavation would extend at least 50 feet upslope of the existing cutslope; and
- Up to 25,000 cubic yards of excavation material would be generated per station (100 feet) along the steep slopes. The excavated materials would need to be end-hauled to a stable, temporary stockpile site.

Subsequently, Pacific Connector developed its Compromise Alternative Route (Alternative 3). The Forest Service indicated that the Compromise Alternative Route would cross an area planned for expansion of the Peavine rock quarry, and issues were raised about the crossing of the East Fork Cow Creek. The Peavine quarry is the largest and most extensively developed quarry within the upper reaches of the watershed and is of strategic importance to the Umpqua National Forest. The Forest Service also requested that the pipeline avoid a known NSO nest patch. Based on the Forest Service objections, we do not recommend use of the Compromise Alternative Route.

Pacific Connector conducted site visits with the Forest Service and additional field studies. Based on this information, they identified the proposed route.

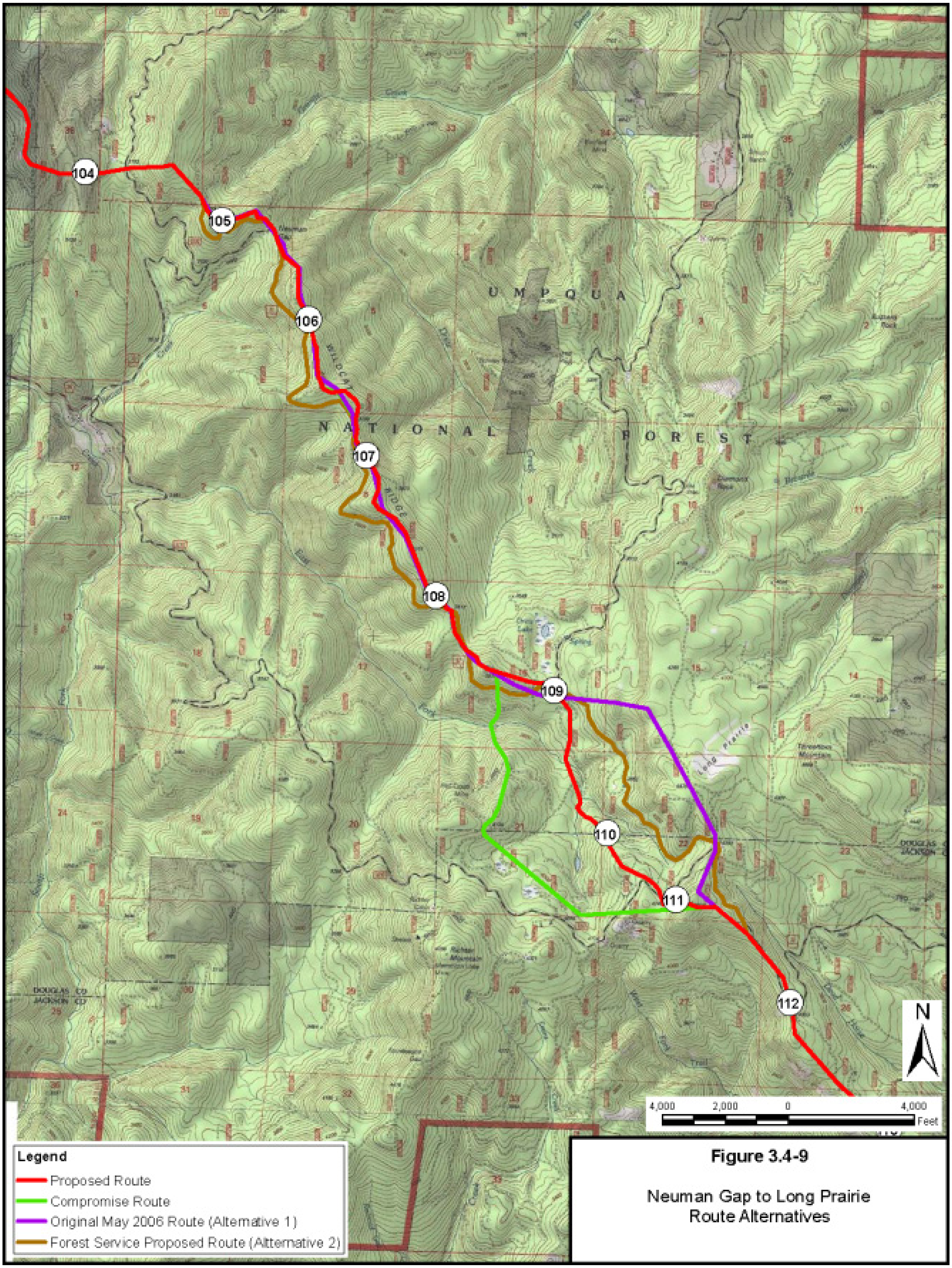

Figure 3.4-9

Neuman Gap to Long Prairie Route Alternatives

TABLE 3.4.2.8-1

Comparison of Umpqua National Forest Alternative Routes With the Corresponding Segment of the Proposed Route Between Neuman Gap and Long Prairie – MPs 105 to 111

Impact/Issue	Proposed Route	Compromise Alternative Route (Alternative 3)	May 2006 Alternative Route (Alternative 1)	Forest Service Road 3200 Alternative Route (Alternative 2)
General				
Total length (miles) a/	6.4	6.7	6.4	7.5
Acres of construction right-of-way b/	73	77	73	86
Total acres of construction disturbance	110	117	73 c/	Significant pipeline integrity risks associated with steep side hill construction along the road, geologic hazards and because of the grading requirements (25,000 cy/100 feet).
Acres affected during operations (permanent easement) d/	45	41	39	86
Land Ownership (miles)				
Forest Service	6.4	6.7	6.4	7.5
Private	0.0	0.0	0.0	0.0
State	0.0	0.0	0.0	0.0
Geotechnical				
Miles of steep or difficult terrain to be crossed e/	0.2	0.4	0.1	See construction disturbance comment
Waterbodies and Wetlands				
Number of waterbodies and wetlands crossed f/	7	6	0	0
Total waterbody and wetland disturbance during construction (acres)	0.2	0.3	0	0
Land Use				
Land allocations (miles):				
Matrix	2.9	3.3	3.1	3.3
LSR	3.5	3.4	3.3	4.2
Riparian Reserves	0.5	0.2	0.0	0.3
Evergreen Forest, Mixed conifer (miles)	4.2	3.9	3.4	5.6 h/
Regeneration Forest (miles)	1.8	2.3	2.7	1.8 h/
Clearcuts (miles)	0.0	0.0	0.1	0.0 h/
Total forest lands affected (miles)	6.0	6.2	5.9	7.4 h/
Other land use types	0.4	0.5	0.4	0.1 h/
Miles of right-of-way that would be parallel or adjacent to existing rights-of-way	5.6	5.1	5.4	7.3
Cultural Resources				
Number of previously identified cultural resources along route	0	1 – site 2 – isolated finds	3	0
Number of newly identified cultural resources along route	1 – site 2 – isolated finds	N/A	1	N/A
Critical Habitat g/				
Acres of federally listed critical habitat for NSO	52	33	34	40 (95-foot ROW only)
Miles of federally listed critical habitat for NSO crossed	6.4	6.7	6.3	7.5
NSO core area (0.5 mile buffer of nest site)	3	4	3	3

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ The construction right-of-way for the proposed route and alternative route is 95 feet.
c/ TEWAs for the alternative route have not been designed and are not included in the total acres of disturbance. Pacific Connector estimates that the number and acres of these would be less than those required for the proposed route because the alternative route does not cross any streams or have the length of slope crossings as does the proposed route.
d/ The assumed permanent easement for both the proposed route and alternative route is 50 feet; however, Pacific Connector will only maintain vegetation within 15 feet of the pipeline centerline for a total of 30 feet in the long term.
e/ Based on slopes that are greater than 50 percent (based on 10-meter digital elevation model). However, Pacific Connector has routed the alignment to ensure constructability, safety, and long-term stability by avoiding side slopes and approaching slopes with the alignment obliquely or perpendicularly to the slope.
f/ PNW Hydrography Framework Clearinghouse. Ditches were excluded.

TABLE 3.4.2.8-1

Comparison of Umpqua National Forest Alternative Routes With the Corresponding Segment of the Proposed Route Between Neuman Gap and Long Prairie – MPs 105 to 111

Impact/Issue	Proposed Route	Compromise Alternative Route (Alternative 3)	May 2006 Alternative Route (Alternative 1)	Forest Service Road 3200 Alternative Route (Alternative 2)
g/ Includes acres of impact associated with the construction right-of-way and TEWAs. This analysis used the final revised critical habitat designation (2008).				
h/ The proposed Forest Service route follows existing Forest Service Road 3200. Construction of the Forest Service proposed route would require extensive side-cuts; therefore, miles crossed considered habitat adjacent to the road.				

The proposed route would avoid the Peavine quarry; avoid crossing the known NSO nest patch; provide better crossing locations of the East Fork Cow Creek; and avoid the Peavine Camp, a dispersed recreation site. We conclude that none of the alternative routes within the Umpqua National Forest from near Neuman Gap to near Long Prairie, between MPs 105 to 111, would offer significant environmental advantage over the proposed route

3.4.2.9 East Side of the Rogue River Access Alternatives

During the scoping period, landowners along Old Ferry Road raised concerns about the use of that road for access to the HDD drill site on the east side of the Rogue River during pipeline construction.[15] Therefore, Pacific Connector researched the possibility of finding other alternative access roads to the east side of Rogue River crossing, in the vicinity of MP 123.0.

BLM Road 34-1-23

It may be possible to use existing BLM Road 34-1-23 (Indian Creek Firebreak) as access to the east side of the Rogue River. Use of that road would require driving 2.3 miles on BLM Road 34-1-23 to about MP 125.0, then traveling about 2.2 miles along the new pipeline right-of-way westward to the HDD site. Portions of the pipeline right-of- way would exceed 65 percent grade, which would require that essentially all vehicles receive towing assistance to negotiate the grades. We conclude this may create a safety hazard. Therefore, we have not considered use of this road any further.

New Temporary Access Road

We considered the construction of a new temporary access road to the HDD drill site, on the east side of Old Ferry Road. Figure 3.4-10 shows the potential new road location. Our road design assumptions included:

- the road must be able to handle traffic for the duration of the construction window;
- the road would be reclaimed and revegetated back to its original condition and contours after construction;
- the road would need to be approximately 16 feet wide; and
- the maximum grade for the road could not exceed 12 percent.

[15] See the letter dated October 27, 2012 from Marcella and Alan Laudani and the testimony of Marcella Laudani at the August 30, 2012, public meeting in Medford, and the letter dated October 26, 2012, from Bob Barker and his testimony at the October 10, 2012, public meeting in Canyonville, under Docket No. PF12-17-000.

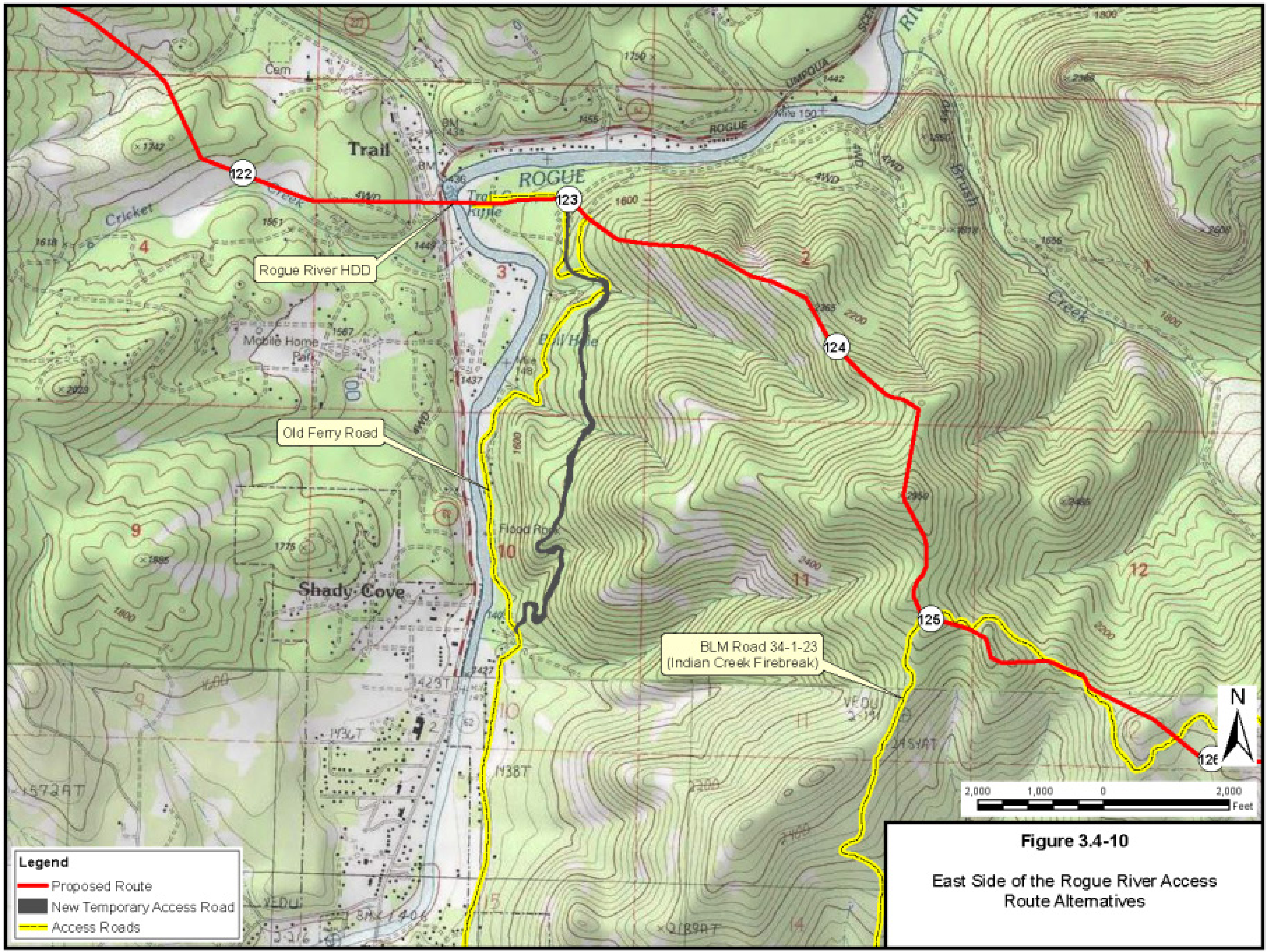

Figure 3.4-10

East Side of the Rogue River Access Route Alternatives

Table 3.4.2.9-1 provides a comparison of the potential new access road with the existing Old Ferry Road. Construction of the new road would result in about 11 acres of disturbance. It is estimated that the combined cut and fill volumes to create a new temporary access road would be 120,000 cy of material, not including the rock to be transported in for the road base. The new TAR would cross approximately 1.4 miles of soils with limiting characteristics that would make disturbed areas difficult to reclaim because they have high erosion potential, steep slopes, large

TABLE 3.4.2.9-1

Comparison of Access Road Alternatives to Reach the East Side of Rogue River

Alternatives Analysis		**Existing Old Ferry Road Improvement (Proposed)**	**New Temporary Access Road Alignment (Alternative)**
General			
Road length (miles) a/		1.6	1.4
Road construction right-of-way (acres)		0 b/	11
Number of TEWAs c/		8	0
Acres of TEWAs		<1	0
Land Use			
Land Ownership (miles)	Private	<0.1	2.9
	State	0.0	0.0
	Federal (BLM/NFS Lands)	0.2	7.9
Number of landowner parcels crossed		22	7
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of alternative length)		1.6	0.2
BLM Visual Resource Management II (acres)		<1	8
Waterbodies and Wetlands			
Number waterbodies crossed d/		9	6 e/
Number of wetlands crossed f/		0	0
Vegetation			
Agricultural lands affected (acres)		0	0
Total forest clearing (acres) g/		<1	11
Biological Resources			
Big game winter range (acres)		<1	8
Soils			
Steep or difficult terrain (miles) h/		0.0	0.0
Highly erosive soils (miles) i/		38.0 j/ (TEWAs)	1.2
Reclamation sensitivity (miles) k/		39.0 l/ (TEWAs)	1.4

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).

a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.

b/ The existing road prism of Old Ferry Road is estimated to be an average of approximately 12 feet in width. To utilize the road, minor brushing, grading, and graveling to fill pot holes would be required within the existing road prism.

c/ Temporary extra work areas associated with improvements required on the existing Old Ferry Road for curve widening, and turnouts (the eight TEWAs would be located in 6 areas along Old Ferry Road). No additional temporary extra work areas are associated with the "new road construction" because all necessary construction footprint requirements are included in the road construction right-of-way.

d/ From Pacific Northwest Hydrography Framework Clearinghouse data layers (http://hydro.reo.gov/). No stream widths are provided. Waterbodies are not fish bearing based on StreamNet data (http://www.streamnet.org) and BLM fish presence data (Fsh_aa_a_med_fishbearing).

e/ Four waterbodies crossed on the new road alignment would be new, previously undisturbed waterbody crossings requiring in-water work to install culverts if flowing at the time of construction.

f/ No wetlands are crossed on the proposed Old Ferry Road based on field surveys.

g/ Limited tree clearing required for Old Ferry Road improvements. The new temporary access road would disturb mixed forest typed primarily in the late successional forest age class (80-175 years) based on the BLM's Forest Inventory coverage.

h/ Based on Soil Mapping Units that have slopes of 50-75 percent and have a water erosion rating of high or severe (SCS 1993).

i/ Based on Soil Mapping Units that have a water erosion rating of high or severe (SCS 1993). Approximately 1.2 miles of soil would be crossed in Soil Mapping Unit 122E, which has a Moderate to High Erosion Hazard Potential.

j/ Three TEWAs associated with the Old Ferry Road improvements are located on Soil Mapping Unit 122E which has a Moderate to High Erosion Hazard Potential.

k/ Reclamation Sensitivity – soils having reclamation sensitivity is a combined rating for soils with high or severe erosion potential, steep slopes, large stones, shallow soils, and saline or sodic conditions and clayey soils (greater than 40 percent). This also includes soil map units with dominant amounts of rock outcrop.

l/ Seven TEWAs associated with the Old Ferry Road improvements are located on Soil Mapping Units 144G or 122E, which have a Reclamation Sensitivity Rating.

stones, or are shallow to bedrock. Of the land that would be crossed by the new access road,73 percent is public land managed by the BLM. The remaining 27 percent is owned by six private landowners. If this alternative access were to be required, Pacific Connector would not acquire permanent rights to the road, and the road could not be used for public use.

The new TAR disturbance located on BLM lands (about 8 acres) would be within an area designated as Visual Resource Management Class II (VRM II). The objective of the VRM II class is to retain the existing character of the landscape. The level of change to the landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Pacific Connector expects that the new TAR would not meet the BLM's visual quality objective and the road would be visible to many residences on the west side of the river in the communities of Shady Cove and Trail.

The new TAR would disturb about 8 acres of big game winter range within an Elk Management area on BLM lands. Almost all of the new disturbance associated with the new TAR would not be co-located with rights-of-way or other previous disturbance and would cause additional habitat fragmentation. Based on the data above, we do not recommend use of the new access road to the Rogue River HDD site.

Existing Old Ferry Road-Revised Improvements

Existing Old Ferry Road is a privately owned and maintained access road to houses located on the east side of the Rogue River opposite of the communities of Shady Cove and Trail. That road would need to be improved prior to its use by Pacific Connector for construction access. Improvements could be limited to several turn outs, curve widenings, and one staging area. Pacific Connector would maintain Old Ferry Road during the construction window. Once the HDD crossing under the Rogue River is installed, Pacific Connector would revegetate all disturbed areas and restore Old Ferry Road to its former condition, or better.

As noted in table 3.4.2.9-1, the use of the existing Old Ferry Road to access the Rogue River drill site would require installing eight small TEWAs (less than about 1 acre total) in six locations along the 1.6-mile road to accommodate turn-outs and to widen a sharp curve. These improvements would require only limited tree limb clearing. In comparison, construction of the 1.4-mile-long new temporary access road would require clearing about 11 acres of late successional mixed forest stands (80 to 175 years of age).

Although three of the TEWAs associated with the improvements for Old Ferry Road would be located within VRM II areas, they would be immediately adjacent and co-located with the existing road. The largest TEWA within the VRM II area has also been located in an existing log landing area; therefore, these TEWAs are expected to be consistent with the BLM's VRM II visual quality objectives. Although about less than one-quarter acre of disturbance associated with the improvements to Old Ferry Road would occur within big game winter range on BLM lands, it would occur immediately adjacent to existing disturbance associated with the road.

Construction-related traffic on Old Ferry Road would be temporary and short term, lasting about 60 days total, which is the time Pacific Connector has estimated for completion of the Rogue River HDD. We conclude that improvement and use of the existing Old Ferry Road is the preferred alternative for access to the east side of the Rogue River, provided that the road would remain open to residents throughout all phases of construction. None of the other access road alternatives would offer significant advantages over the proposed improvement of Old Ferry Road.

3.4.2.10 Rogue River National Forest – Robinson Butte to Cox Butte Alternatives Routes

In response to the Forest Service's concerns over impacts to LSR and Riparian Reserves, Pacific Connector identified two route alternatives within the Rogue River National Forest in the vicinity of Robinson Butte and Cox Butte between about MPs 155.1 and 168.9. Table 3.4.2.10-1 provides a comparison of the May 2006 Alternative Route (Alternative 1), the Forest Service Roads Alternative Route (Alternative 2), and the proposed route (Compromise Route, or Alternative 3). These alternatives and the proposed route are shown on figure 3.4-11.

We refer to the route originally proposed by Pacific Connector in May 2006 as Alternative 1 (or the May 2006 Alternative Route). This alternative would deviate from the currently proposed route at about MP 155, and remain south of it on the south side of Robinson Butte near MP 159. From that point southeastwardly, Alternative 1 would closely follow the proposed route but would be straighter and cross through older forests, which provide NSO habitat. As with the proposed route, Alternative 1 would cross Big Elk Road, cross northeast of Cox Butte, and would cross Daley Prairie. The May 2006 Alternative Route would cross into Klamath County and rejoin the proposed route near MP 169. Alternative 1 would be about a mile shorter than the corresponding segment of proposed route. The route variation would cross more waterbodies and wetlands, and would affect more forest. The corresponding segment of proposed route would be adjacent to existing rights-of-way to a greater extent.

The Forest Service's suggested Roads Alternative Route, labeled Alternative 2, would leave the proposed route within the Rogue River National Forest in Jackson County, Oregon, at about MP 155, north of Grizzly Canyon, and head east along Forest Service Roads 410 and 300, around the south side of Robinson Butte along Forest Service Road 3730, south of Big Elk Guard Station along Forest Service Road 3705, across the South Fork Little Butte Creek, turn east along Forest Service Road 3720, entering Klamath County, to Forest Service Road 700, cross the Pacific Crest Trail (PCT) several miles south of Brown Mountain, then head southeast cross-county into the Winema National Forest, across Dead Indian Memorial Highway, and would rejoin the proposed route along Clover Creek Road north of Burton Butte just east of MP 169. The variation would avoid clearing a new corridor, reducing forest fragmentation and habitat loss in the Dead Indian LSR RO227. Also, this alternative would cross the PCT along an existing road, reducing potential impacts to trail users by eliminating a separate crossing. The Forest Service's suggested Roads Alternative Route would be about 3 miles longer than the original route and would require widening the existing roads, which are generally between 20 and 30 feet wide. This would require cutting mature forest in portions of the right-of-way. The Forest Service Roads Alternative Route would result in the largest construction footprint. In concept, acreage of construction impact would be mitigated by the fact that most of the route (14.0 miles of the 15.7-mile route) would be along existing forest roads. However, Pacific Connector determined the pipeline would not be constructible along portions of some roads due to the terrain and the tight radius turns.

TABLE 3.4.2.10-1

Comparison of Rogue River National Forest Alternative Routes with the Proposed Route from Robinson Butte to Cox Butte – MPs 155 to 169

Impact/Issue		May 2006 Alternative	Forest Service Alternative	Proposed Route
General				
Total Length (miles) a/		12.9	15.7	13.8
Acres of construction right-of-way b/		148	180	159
Total acres of construction disturbance		148 d/	180 e/	209
Number of UCSAs		Not designed c/	Not designed c/	45
Acres of UCSAs		Not designed c/	Not designed c/	73
Acres affected during operations (permanent easement) f/		78	95	84
Land Ownership (miles)	Forest Service	11.5	14.3	12.5
	Private	0.5	0.6	0.5
	State	0.0	0.0	0.0
Waterbodies and Wetlands				
Number of waterbodies crossed g/		2	14	6
Total wetland crossing length (feet) h/		0	0	0
Land Use				
Land allocations (miles)	Matrix	0.0	0.0	0.0
	LSR	11.5	14.3	12.5
	Riparian Reserves	1.5	1.1	0.4
Evergreen Forest, Mixed Conifer		6.8	6.0	6.1
Regeneration Forest (miles)		5.9	5.4	5.6
Clearcuts (miles)		0.1	0.0	0.3
Total Forest lands affected (miles)		12.8	11.4	12.0
Other land use types (including Transportation)		0.1	4.3	1.8
Miles of right-of-way that would be parallel or adjacent to existing rights-of-way		1.6	14.0	4.4
Visual Resources				
Visual Impacts along existing Forest roads		Minimal except at existing road crossings	Existing road corridors expected to be significantly altered from 95-foot construction footprint along 13.6 miles of Forest roads.	Minimal except where parallel to existing roads (i.e., 4.4 miles)
Cultural Resources				
Number of previously identified cultural resources along route		1	0 k/	1
Habitat for Federally Listed Species				
Acres of federally listed critical habitat for the NSO l/		148	180	159
NSO activity center		2 - ½ mile buffer of site	2 - ½ mile buffer of site	2 - ½ mile buffer of site

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ The construction right-of-way for the preferred route and original proposed alignment is 95 feet.
c/ TEWAs for the Original May 2006 Route have not been designed and are not included in the total acres of disturbance.
d/ Pacific Connector estimates that the Original May 2006 Route would likely require more TEWAs compared to the compromise route because of side slope construction between approximately MPs 149 and 152.9 and because of the increased number of stream crossings along the Original May 2006 Route.
e/ TEWAs have not been designed for this route and are not included in total construction work area requirements.
f/ The assumed permanent easement for all routes is 50 feet. However, Pacific Connector will only maintain vegetation within 15 feet of the pipeline centerline for a total of 30 feet in the long term.
g/ Waterbodies from PNW Hydrography Framework Clearinghouse.
h/ Wetlands from NWI CONUS data. Surveys identified 422 feet for the May 2009 Route and 56 feet for the Proposed Route.
i/ Crossing distance based on parallel alignment with waterbody feature (i.e., intermittent stream)
j/ Based on ground survey, NWI coverages and photo interpretation.
k/ Includes acres of impact associated with the construction right-of-way and TEWAs.

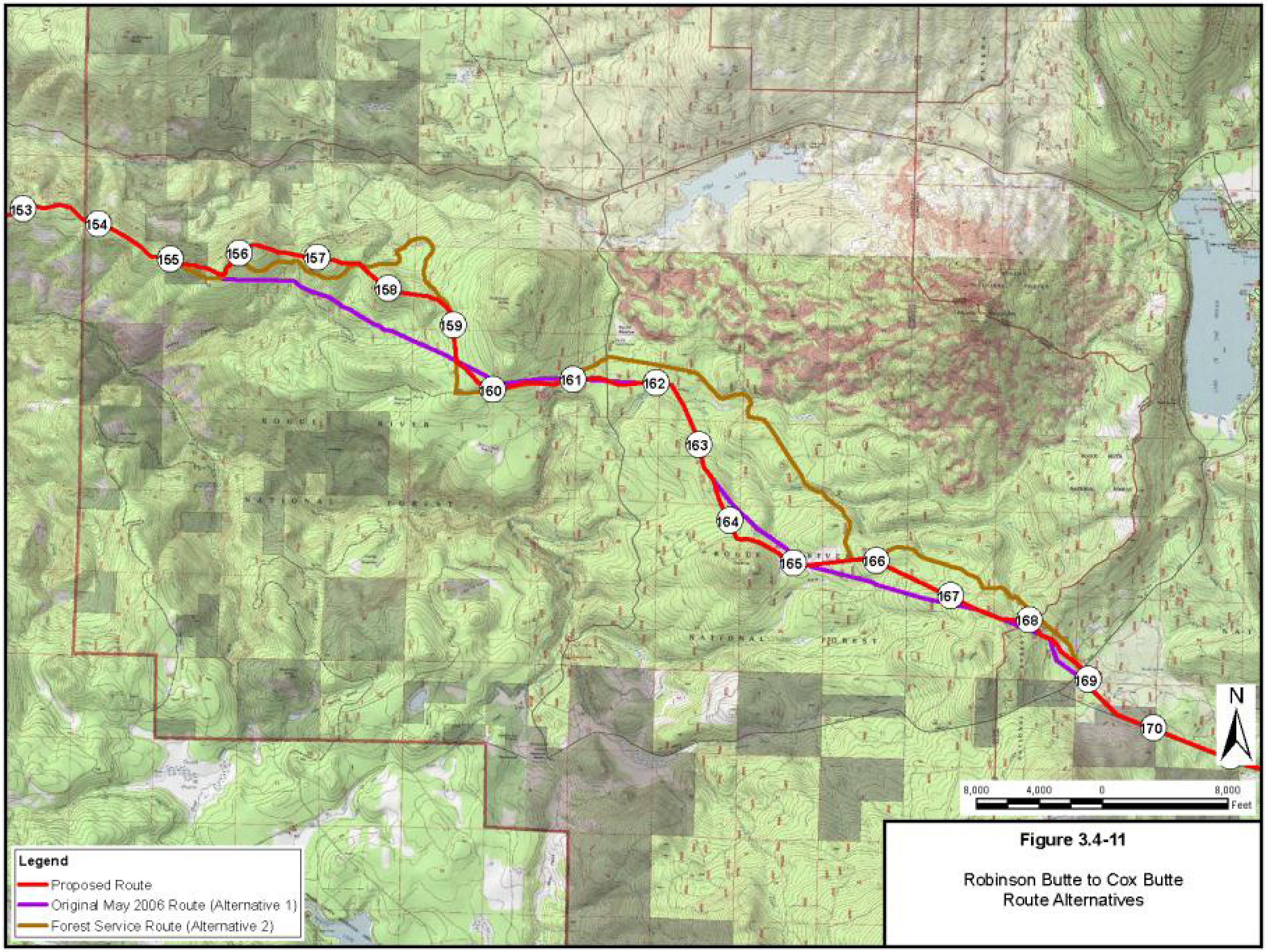

Figure 3.4-11

Robinson Butte to Cox Butte Route Alternatives

Pacific Connector studied the Forest Service's suggested Roads Alternative Route and determined that the alignment was feasible for the most part, except where it followed tight radius road curves. As a result of consultations with the Forest Service, Pacific Connector developed its proposed route (which we refer to as Alternative 3 or the Compromise Route). Pacific Connector adopted a Forest Service recommended realignment between MPs 162.3 and 161.38 into the Compromise Route to avoid the Big Elk NSO patch, located in an NSO core area. This realignment would be about 0.5 mile south of Big Elk Meadow and Guard Station. Pacific Connector made further adjustments along the Compromise Route to minimize side slope construction and extra work area requirements, and to avoid a wetland (Riparian Reserve). This adjustment utilized an existing forest road and regenerating clear-cut area to minimize impacts on mature forest.

All three routes would cross LSR and Riparian Reserve, with the May 2006 Alternative Route crossing the least distance of LSR and the corresponding segment of proposed route crossing the least distance of Riparian Reserve. We conclude that the Compromise Route would avoid or minimize environmental impacts, and neither the May 2006 Alternative Route nor the Forest Service Roads Alternative Route would offer significant environmental advantage over the proposed route.

3.4.2.11 Pacific Crest Trail and Dead Indian Memorial Highway Alternative Routes

Due to concerns raised by the Forest Service and stakeholders who use the PCT, Pacific Connector identified two short alternative crossings of the PCT and Dead Indian Memorial Highway within the Rogue River and Winema National Forests in Klamath County, Oregon, between about MPs 167.5 and 169.1. The western segment crosses the PCT while the eastern segment crosses the Dead Indian Memorial Highway. These two alternative route segments are illustrated with the proposed route on figure 3.4-12. Table 3.4.2.11-1a compares the proposed route with the PCT Alternative Route. Table 3.4.2.11-1b compares the proposed route with the Dead Indian Memorial Highway Alternative Route.

When Pacific Connector first mapped out its pipeline route in 2007, it considered a straight line perpendicular crossing of the PCT at about MP 167.8. Stakeholders including the Forest Service and the Pacific Crest Trail Association requested that Pacific Connector and the FERC consider means of reducing impacts on the PCT and its recreational users. To reduce visual impacts, Pacific Connector's proposed route would use a right-angle 45-degree crossing of the PCT.

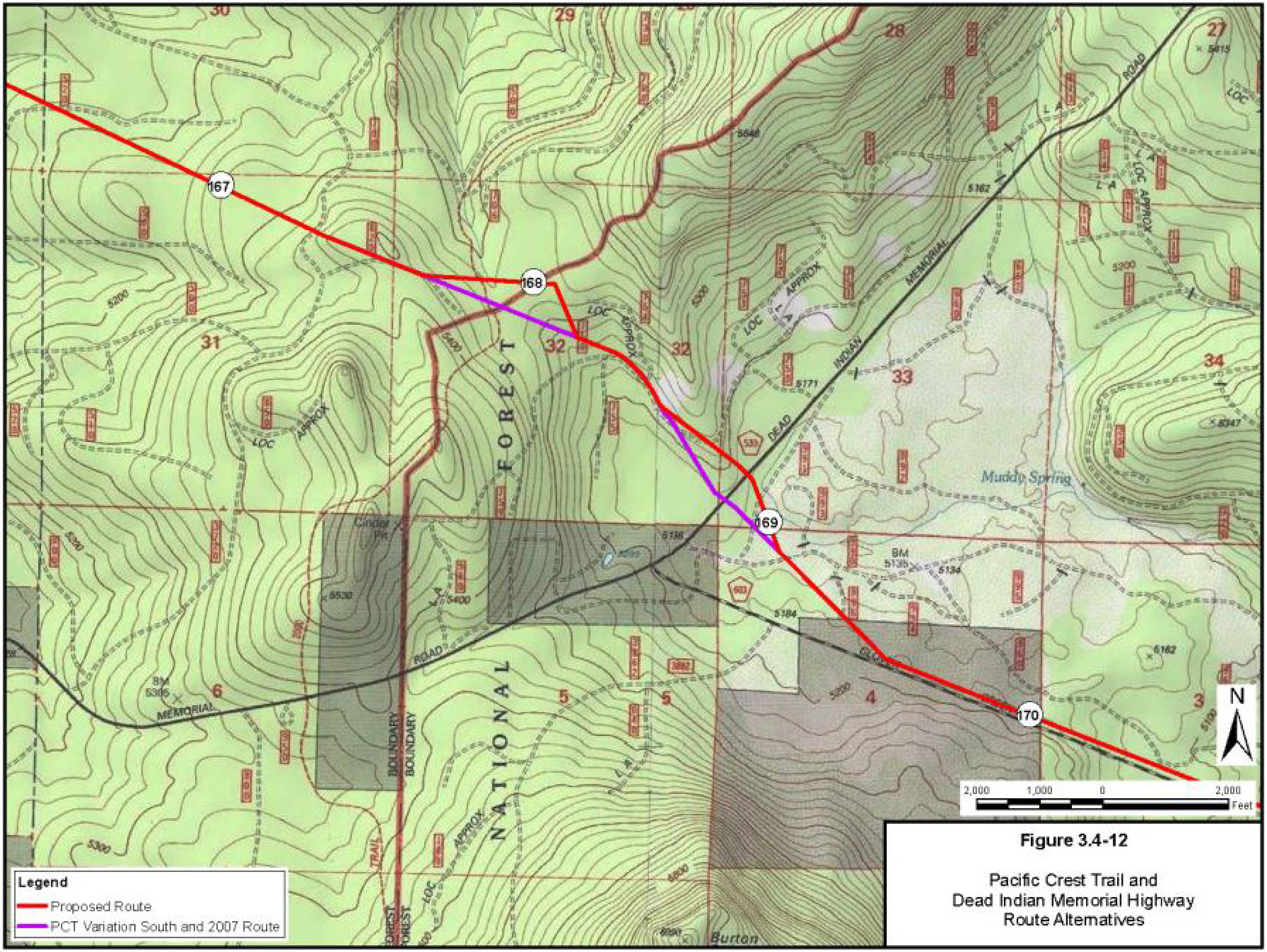

Figure 3.4-12

Pacific Crest Trail and
Dead Indian Memorial Highway
Route Alternatives

TABLE 3.4.2.11-1a

Comparison of the PCT Alternative Route with the Proposed Route

Impact/Issue		**PCT Alternative Route**	**Proposed Route**
General			
Length (miles) a/		0.5	0.6
Construction right-of-way (acres)		6	6
Number of TEWAs (acres)		0	2
Acres of TEWAs		0	<1
Permanent easement (acres) b/		3	4
Land Use			
Land ownership (miles)	Private	0	0
	State	0	0
	Federal (BLM/NFS Lands)	0.5	0.6
Number of landowner parcels crossed		1	1
Number of residences within 50 feet of the construction right-of-way		0	0
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of alternative length)		0	0
LSR – Federal Land Use Designation (acres)		3	4
Riparian Reserves – Federal Land Use Designation (acres)		0	0
Waterbodies and Wetlands			
Number of waterbodies crossed c/		0	0
Length of wetland crossings (feet) c/		0	0
Vegetation			
Agricultural lands affected (acres)		0	0
Total forest clearing (acres)		6	7
	Acres clear-cut/regenerating (0-40 years)	2	4
	Acres mid-seral forest (40-80 years)	0	<1
	Acres Late Successional Forest (80-175 years)	0	0
	Old-Growth Forest (175+ years)	4	3
Biological Resources			
NSO. suitable habitat crossed (acres) d/		6	7
NSO nest patches/cores		0	0
NSO. critical habitat crossed (acres)		3	4
Habitat Category (acres)	1	3	3
	2	2	1
	3	0	3
	4	0	0
	5	0	0
	6	0	0
ESA Fish Species Present/Habitat e/		0	0
StreamNet – Anadromous Fish Distribution f/		0	0
Geotechnical			
Steep or difficult terrain (miles) g/		0	0
Highly erosive soils (miles) h/		0	0
Cultural Resources			
Number of previously recorded cultural resources		0	0
Number of newly identified cultural resources		n/a	0

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ Acres of permanent easement calculated based on a 50-foot width.
c/ Based on Pacific Connector field surveys.
d/ Forest Service (2005a)
e/ FWS, NMFS, and StreamNet (http://www.streamnet.org).
f/ ODFW (2000a, 2006a); StreamNet.
g/ Based on Soil Mapping Units that have slopes of 50-75 percent and have a water erosion rating of high or severe (Forest Service 1976).
h/ Based on Soil Mapping Units that have a water erosion rating of high or severe (Forest Service 1976).

TABLE 3.4.2.11-1b

Comparison of the Dead Indian Memorial Highway Alternative Route with the Proposed Route

Impacts/Issues		Dead Indian Memorial Highway Alternative Route	Proposed Route
General			
Length (miles)		0.6	0.6
Construction right-of-way (acres)		7	7
Number of temporary extra work areas (TEWAs)		7	7
Acres of TEWAs		3	3
Permanent Easement (acres) a/		3	4
Land Use			
Land Ownership (miles)	Private	0	0
	State	0	0
	Federal (BLM/NFS Lands)	0.6	0.6
Number of landowner parcels crossed		2	2
Number of residences within 50 feet of construction right-of-way		0	0
Miles of right-of-way parallel or adjacent to existing rights-of-way (percent of alternative length)		0	0
LSR – Federal Land Use Designation (acres)		0	0
Riparian Reserves - Federal Land Use Designation (acres)		0	0
Waterbodies and Wetlands			
Number of waterbodies crossed		1	1
Length of waterbody crossings (feet)		1	1
Number of wetlands crossed		0	0
Length of wetland crossings (feet)		0	0
Vegetation			
Agricultural lands affected (acres)		0	0
Total forest clearing (acres)		10	10
	Acres clear-cut/regenerating (0-40 years)	6	8
	Acres mid-seral forest (40-80 years)	<1	<1
	Acres Late Successional Forest (80-175 years)	2	1
	Acres Old-Growth Forest (175 + years)	2	1
Biological Resources			
Northern Spotted Owl Suitable Habitat Crossed (acres) b/		4	2
Northern Spotted Owl nest patch/cores (NSO)		0	0
Northern Spotted Critical Habitat Crossed (acres)		10	10
Habitat Category(acres) c/	1	4	2
	2	6	8
	3	0	0
	4	0	0
	5	0	0
	6	0	0
ESA Fish Species Present/ Habitat d/		0	0
StreamNet – Anadromous Fish Distribution e/		0	0
Geotechnical			
Steep or difficult terrain (miles) f/		0	0
Highly erosive soils (miles) g/		0	0
Cultural Resources			
Number of previously recorded cultural resources		0	0
Number of newly identified cultural resources		0	0

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Acres of permanent easement calculated based on a 50-foot width.
b/ Forest Service (2005a).
c/ See Section 3.4.1.4 (Special Habitats) in Pacific Connector's Resource Report 3 filed with its September 2007 application to the FERC.
d/ FWS, NMFS, and StreamNet (http://www.streamnet.org).
e/ ODFW 2000a, 2006b; StreamNet.
f/ Based on Soil Mapping Units that have slopes of 50-75 percent and have a water erosion rating of high or severe (Forest Service 1976).
g/ Based on Soil Mapping Units that have a water erosion rating of high or severe (Forest Service 1976).

The original straight line crossing of the PCT, which we refer to as the PCT Alternative Route, would have created an unnatural tunnel-like visual effect through the forest that would not meet Forest Service standards for a Retention or Partial Retention VQO for the trail. We discuss a proposed amendment to the Rogue River National Forest LRMP that would allow for increased time for revegetation to meet VQO standards for the pipeline crossing of the PCT in sections 4.1.3.4 and 4.8.2.4 of this EIS. It is estimated that about 4,000 feet of cleared right-of-way would be visible from the trail/pipeline intersection along the PCT Alternative Route.

The proposed route would be slightly longer (about 0.1 mile) and construction would affect less than 1 acre more than the PCT Alternative Route. Three more pipeline bends at points-of-intersection would be required for the proposed route, resulting in the clearing of additional land for TEWAs. These TEWAs would be located within regenerating forest. However, the proposed route would impact less LSOG forest and minimize impacts within the Ichabod Quarry South NSO Home Range. Pacific Connector would reduce the width of the construction right-of-way at the PCT crossing, and would implement other measures to minimize impacts on users of this trail, as more fully discussed in section 4.8.1.2 of this EIS. The advantage of the proposed route is that it would reduce the length of permanently cleared right-of-way that would be visible from the trail to about 1,000 feet.

The FERC's May 2009 FEIS for Docket No. CP07-441-000 showed a straight line pipeline crossing of the Dead Indian Memorial Highway at about MP 168.8. Between 2010 and 2012, Pacific Connector conducted environmental surveys that found rare fungi considered to be S&M species by the Forest Service near the crossing of Dead Indian Memorial Highway. S&M species on NFS lands are more fully discussed in section 4.7 of this EIS. To avoid impacts on these sensitive species, Pacific Connector modified its proposed pipeline route between about MPs 168.5 and 169.1 to take a right-angle 45-degree turn to the east when crossing the highway.

The proposed route would reduce visual impacts on the PCT, and avoid rare fungi near the crossing of the Dead Indian Memorial Highway. We conclude that the alternative routes would not offer significant environmental advantages over the proposed route's crossings of the PCT and Dead Indian Memorial Highway between about MPs 167.5 and 169.1.

3.4.2.12 Keno Access Road and Clover Creek Road Alternative Routes

The currently proposed pipeline route follows Clover Creek Road between about MPs 169.5 and 187.4 in Klamath County, Oregon. Pacific Connector developed this proposed route after considering the Keno Access Road Alternative and the 2007 Clover Creek Road Alternative Routes. The proposed route and the alternative routes are shown on figure 3.4-13 and compared in table 3.4.2.12-1.

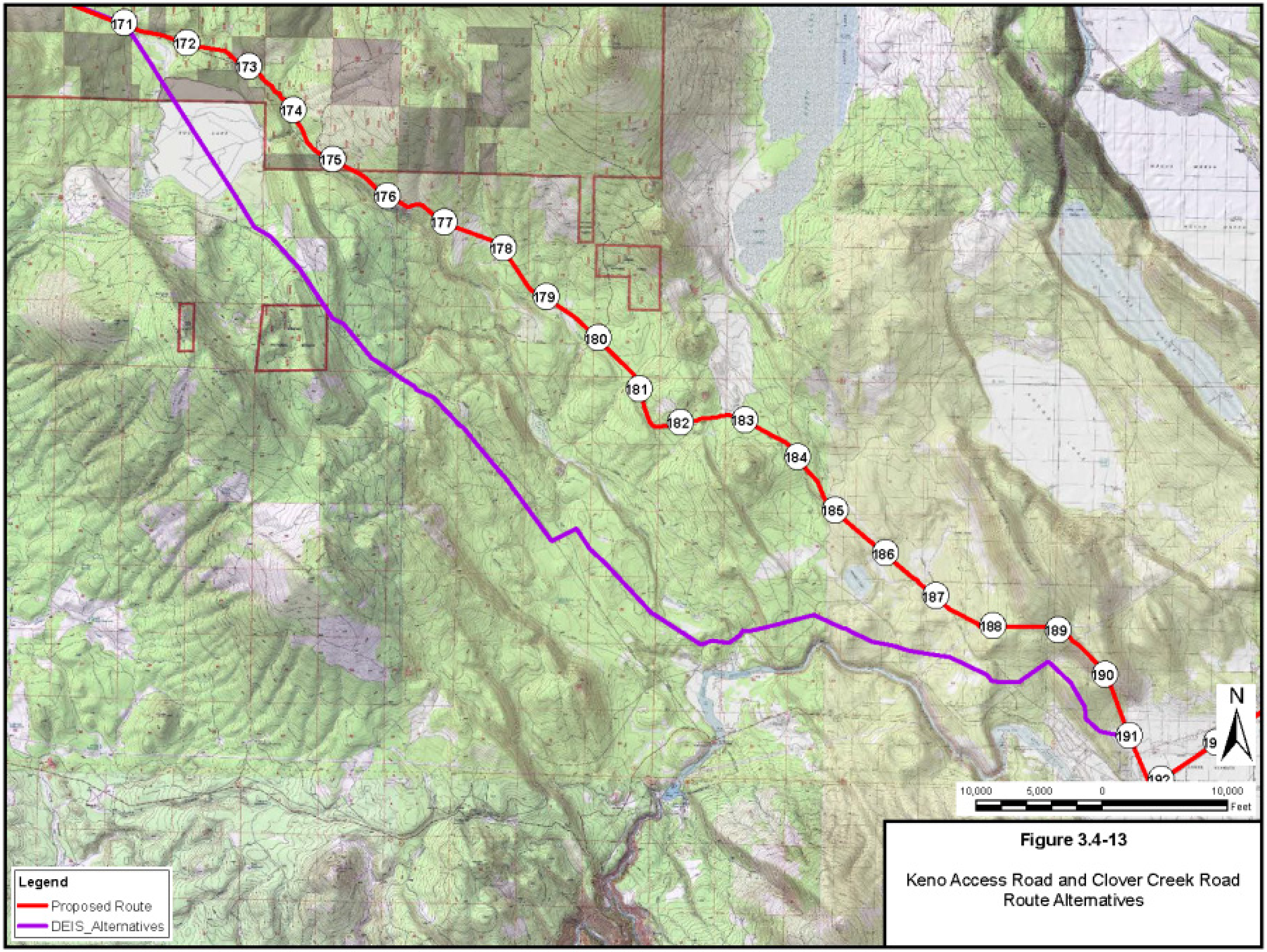

Figure 3.4-13

Keno Access Road and Clover Creek Road Route Alternatives

TABLE 3.4.2.13-1

Comparison of the Keno Access Road and 2007 Clover Creek Road Alternative Routes With the Proposed Route

Impact/Issue		Proposed Route	Keno Access Road Alternative	2007 Clover Creek Road Alternative
General				
Total length (miles) a/		16.3	18.7	16.9
Acres of construction right-of-way b/		187	215	288
Total acres of construction disturbance		204	298	215
Acres affected during operations (permanent easement)		99	140	99
Landowner parcels crossed		9	16	11
Number of residences within 50 feet of construction right-of-way		0	0	0
Land ownership (miles):	Private	11.7	15.7	11.6
	State	0.0	0.2	0.0
	Federal (BLM/NFS lands)	4.6	2.8	4.7
Geotechnical				
Miles of steep or difficult terrain to be crossed		0	0	0
Waterbodies and Wetlands				
Number of wetlands and waterbodies crossed		9	23	9
Length of wetlands and waterbodies crossed (miles)		0.2	2.1	0.2
Land Use				
Agricultural land affected (miles)		0.0	9.5	0
Forest lands affected (acres)		161	72	172
Miles of right-of-way that would be parallel or adjacent to existing rights-of-way		16.3	0	16.3
Biological Resources				
Oregon spotted frog habitat crossed c/		Avoided	Yes	Avoided
Klamath redband trout habitat crossed d/		Avoided	Yes	Avoided
NSO	Critical habitat miles crossed e/	0	1.6	0
	Critical habitat acres within 1 mile of route e/	Similar to 2007 Route	4,238	2,514
	Suitable habitat within 1 mile of route f/	Similar to 2007 Route	6,547	5,534
	Number of nest sites	Similar to 2007 Route	3 NSO within 1 mile of route (1 historical)	2 NSO within 1 mile of route (1 historical)
Bald eagle g/		Similar to 2007 Route	2 active nests within 0.3 mile of route	1 active nest within 0.6 mile of route

General: All values are rounded (acres to nearest whole acre, miles to nearest tenth of a mile, feet to nearest whole foot).
a/ Route Alternative lengths cannot be accurately calculated by comparing mileposts due to shifts in the alignment.
b/ The construction right-of-way for the proposed route and the alternative is 95 feet.
c/ Known Habitat of the Oregon spotted frog would be crossed on the proposed route between MPs 171.29 and 191.34 in Wetland AW 182. Pacific Connector would utilize conservation measures to minimize impacts to the spotted frog such as seasonal construction windows to avoid critical breeding periods and life stages. The alternative route would avoid the known Oregon spotted frog habitat.
d/ The proposed route crosses Spencer Creek above River Mile 12 in areas of known red band trout spawning habitat. Pacific Connector would use conservation measures to minimize impacts to the red band trout, including using the “dry” open cut crossing method (flume or dam and pump) within the ODFW-specified crossing window to protect the trout. The Offset Alternative crosses Spencer Creek above River Mile 12 where red band trout is not documented. Pacific Connector would also use the “dry” open cut crossing method within the ODFW-specified crossing windows to minimize impacts to aquatic species.
e/ NSO critical habitat coverage obtained from FWS Critical Habitat Portal [online: http://criticalhabitat.fws.gov/].
f/ NSO suitable habitat determined through GIS analysis using a BioMapper product created by the Forest Service Pacific Northwest Research Station and further refined based on consultation with FWS using aerial photo reconnaissance and GIS Neighborhood Analysis to determine areas with at least 30 percent suitable habitat.
g/ Bald eagle documented sites from bald eagle nest locations and history of use in Oregon and the Washington portion of the Columbia River Recovery Zone, 1971 through 2006 (Isaacs and Anthony 2007).

When Pacific Connector first mapped out its pipeline route, it wanted to follow the existing GTN Medford Lateral as much as possible and parallel a portion of the Keno Access Road between the boundary of the Winema National Forest and town of Keno. However, the Forest Service and other agencies raised concerns that this route, which we refer to as the Keno Access Road Alternative, would cross Buck Lake, an extensive emergent wetland, that provides habitat for the Oregon Spotted Frog (a federally listed candidate species) and would cross Spencer Creek at a location where redband trout are known to spawn.

After consultations with an interagency task force, in 2007 Pacific Connector suggested a new alternative route that would parallel but be offset from Clover Creek Road, to avoid impacting the species associated with the crossing of Buck Lake and Spencer Creek along the previously identified Keno Access Road Alternative Route. The Forest Service then requested that Pacific Connector move the pipeline closer to Clover Creek Road to eliminate the strip of trees left between the road and the Clover Creek Alternative Route.

The route adjacent to Clover Creek Road was filed as the proposed route in Pacific Connector's June 2013 application to the FERC. The proposed route has minor deviations from the road to avoid steep slopes or road cuts (at MPs 172.3-172.5, 173.0-173.7, 182.3, and 184.2-184.9), to avoid waterbodies and wetlands (at MPs 172.5 and 173.5-174.5), and to avoid S&M fungi species (at MPs 171.9-172.8 and 173.2-173.3).

We find the proposed route environmentally preferable to both the Keno Access Road and the 2007 Clover Creek Road Alternative Routes. First, the proposed route is shorter than either alternative resulting in less overall impact. Second, the proposed route would avoid crossing Buck Lake and Spencer Creek at locations that contain habitat for sensitive species. Lastly, moving the pipeline closer to Clover Creek Road would reduce visual impacts from forest clearing in comparison to the off-set location of the pipeline along the 2007 alternative. We conclude that the Keno Access Road Alternative and 2007 Clover Creek Road Alternative Routes would not offer significant environmental advantages over the proposed route between about MPs 169.5 and 187.4.

3.4.3 Pipeline Alternatives Over Federal Lands

Several of the pipeline alternative routes discussed above cross federal lands. Specifically, the Weaver Ridge Alternatives between MPs 42.7 and 49.8, the Camas Valley Alternatives between MPs 50.2 and 53.0, and the NSO Nest Patch Alternative between MPs 81.2 and 82.5 would cross BLM lands. The Neuman Gap to Long Prairie Alternatives between MPs 104.8 and 111.5, the Robinson Butte to Cox Butte Alternatives between MPs 155.1 and 168.9, the PCT Alternative between MPs 167.7 and 168.4, and the Dead Indian Memorial Highway Alternative Route between MPs 168.6 and 169.1 would be on NFS lands. In these cases, the BLM and the Forest Service conducted an analysis of the alternatives and found the proposed route environmentally preferable. The FERC staff concurs.

However, the Forest Service and BLM also considered if there were alternatives that would avoid or minimize impacts on specific land management allocations, such as LSRs and Riparian Reserves. In 1994, the Secretaries of Agriculture and Interior signed the *Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents with the Range of the Northern Spotted Owl* (NSO ROD). The NSO ROD amended LRMPs for all National Forests within the range of the NSO in California, Oregon, and Washington states, and created new land use allocations known as LSRs and Riparian Reserves. The NSO ROD indicated that LSRs are to be managed to protect and enhance old-growth forest conditions.

All of the NFS lands on the Rogue River National Forest lie within the Dead Indian LSR RO227, while about half of the proposed pipeline route across the Umpqua National Forest would be within the South Umpqua River/Galesville LSR RO223. There are no designated LSRs where the pipeline would be located within the Winema National Forest.

The ROD stipulates that non-silvicultural activities in LSR, such as the installation of a pipeline or other utilities, would only be allowed where those activities could be demonstrated to be neutral, or may have benefits for the creation and maintenance of late-successional habitat. New developments, such as a pipeline, may be allowed if it would have a public benefit and if adverse effects on the LSR could be minimized or mitigated. In designing its pipeline project, Pacific Connector followed the principles outlined in the Regional Interagency Executive Committee memorandum dated January 3, 2001, regarding New Developments in LSRs.

The BLM and Forest Service indicated that amendments to their LMPs may be necessary to allow the Pacific Connector pipeline to cross federal lands. These amendments are described as part of the proposed action in sections 2.1.3 and 4.1.3.4 of this EIS.

3.4.3.1 Public Need

The Commission will consider the need and public benefit of this Project when making its decision on whether or not to authorize it, as documented in the Project Order. The cooperating agencies will consider public benefit within the context of each agency's respective authorities. Each cooperating agency will document its decision in the applicable permit, approval, concurrence, or determination.

3.4.3.2 Avoidance of Late Successional Reserves

Because the proposed Pacific Connector pipeline is a linear, large-diameter, high-pressure natural gas pipeline that must be routed to ensure safety, stability, and integrity, it is unreasonable, impractical, and infeasible to entirely avoid all designated LSRs for the following reasons:

- The overall extent of the designated LSR land allocation in the area crossed by the pipeline on BLM and NFS lands makes it unrealistic to completely avoid LSRs;
- Long re-routes around LSRs would be impractical because of other determining factors, such as topography, the overall length and direction of the pipeline, and the large size of individual LSRs within contiguous tracts of NFS lands; and
- Safety and constructability requirements for installation of the pipeline, in areas with limited geological hazards to ensure the long-term integrity of the pipeline and stability of the right-of-way makes it infeasible and unreasonable to avoid LSRs by aligning the pipeline on steep side slopes or other potentially unstable areas.

3.4.3.3 Project Design Measures to Minimize Adverse Impacts on Late Successional Reserves and Riparian Reserves

To comply with the Principles of the 2001 Regional Interagency Executive Committee memorandum regarding new developments in LSRs and Riparian Reserves, this alternative analysis discusses how the proposed Pacific Connector pipeline and associated facilities have been designed to have the least possible adverse impacts on these resources. In summary, this alternative analysis will discuss: (1) the project design measures that were implemented to avoid LSRs and Riparian Reserves, where feasible; (2) the project design procedures that minimize impacts to LSRs and Riparian Reserves; (3) the measures that would be implemented to rectify project-related impacts to LSRs and riparian reserves; (4) the project design measures that would be applied to reduce impacts over time by maintenance operations during the life of the action; and (5) the compensatory mitigation that Pacific Connector proposes to mitigate for unavoidable impacts to LSRs and Riparian Reserves.

Pacific Connector worked closely with the BLM and Forest Service to minimize impacts to LSRs and Riparian Reserves during the proposed pipeline route selection and construction footprint design process through the following steps.

- Performing routing and geotechnical evaluations to ensure the most stable pipeline alignment for long-term stability. These efforts minimize the potential need to conduct future maintenance activities, which could require additional impacts to suitable NSO habitat, LSRs, and Riparian Reserves.
- Where feasible, the alignment was co-located with existing roads to minimize disturbance impacts.
- Areas of side slopes were avoided to the extent possible to minimize the need for additional TEWAs to accommodate the necessary cuts and fill to safely construct the pipeline.
- The number and size of the TEWAs in LSRs and Riparian Reserves were minimized to those critical for safe pipeline construction.
- Where feasible, TEWAs were located in previously disturbed areas (recently logged) or in young regenerating forest stands.
- Existing roads would be used to access the construction right-of-way during construction and the right-of-way would be used as the primary travel-way to move equipment and materials up and down the right-of-way to remove the need for additional roads within LSRs and riparian reserves. The existing roads would also be used during operations to avoid the need for new access routes.

To help rectify pipeline-related impacts to LSRs, Pacific Connector would replant all disturbed areas of the construction footprint as described in its ECRP. Pacific Connector would replant or allow trees to naturally regenerate to within 15 feet of the pipeline centerline within the permanent pipeline easement to minimize potential long-term effects of the pipeline easement. Vegetation within the remaining area of the pipeline easement would be maintained as necessary to allow for DOT-required visual aerial survey requirements, and to prevent the root systems of trees from damaging pipe coatings and pushing on the pipeline.

Additionally, Pacific Connector understands that unavoidable impacts on LSRs would require mitigation measures that in the long run would make the Project impacts neutral or beneficial. Pacific Connector has agreed to fund a suite of Forest Service- and BLM-recommended measures that are described in chapter 2 of this EIS to mitigate Project-related impacts to LSRs and Riparian Reserves in a manner that would ensure that the Project is neutral or beneficial to the creation and maintenance of late-successional habitat (see appendix F). Example mitigation projects would include reclaiming existing disturbance areas within LSRs such as roads that are no longer required, and non-economic thinning or other management projects to accelerate old growth characteristics within young or dense forest stands. The funds would also be used to acquire conservation easements or acquire adjacent lands or privately owned parcels within agency boundaries that could be managed to maintain LSR habitat. Additionally, the Forest Service and BLM would re-allocate Matrix or other land to LSR, where feasible.

3.4.4 Minor Route Variations Incorporated into the Proposed Pipeline Route

During the course of refining the route alignment for the currently proposed route, Pacific Connector incorporated a number of minor route variations to address agency concerns and landowner requests, constructability issues or constraints, to avoid cultural resources or geological hazards, or reduce impacts on threatened or endangered species. These minor route variations are listed in table 3.4.4-1. In all the cases listed on the table below, we find the minor route changes to be environmentally preferable and acceptable. These minor route variations were incorporated into the proposed route that is analyzed in section 4 of this EIS. We did not identify any alternative routes that would be environmentally preferable to these minor route variations.

TABLE 3.4.4-1

Minor Deviations Incorporated into the Proposed Pipeline Route

Deviation Name/MPs	County	Rationale for Route Realignment
Stock Slough MPs 9.7–10.3	Coos	The proposed route has been slightly modified between MPs 9.7 and 10.3 from the FERC May 2009 FEIS route. The route modification avoids crossing Stock Slough Road (County Road 54) in a steep road cut as the alignment descends a steep ridge slope. Further, the route modification avoids two crossings of Stock Slough in the tight meandering bends which were crossed immediately below Stock Slough Road and immediately adjacent to a residence.
Muenchrath/Wilson MPs 12.1–12.8	Coos	During an on-site meeting with Mr. Muenchrath, an agreement was reached to route the pipeline farther east, away from the Muenchrath and Wilson residences. Although a potential geological hazard was identified along this route, Pacific Connector determined that the new proposed reroute to the east could be built and maintained over the long term if certain site-specific construction, backfill, and restoration techniques were adhered to.
Boone Creek MPs 15.3–16.0	Coos	The alignment in this area was adjusted based on geological hazard evaluations. The proposed route now minimizes sidehill and steep slope construction requirements.
BPA Adjustments MPs 20.9–22.3	Coos	The alignment between MPs 20.9 and 22.3 was adjusted based on Pacific Connector's meeting with the Bonneville Power Administration (BPA). BPA requested that the pipeline easement more closely abut the powerline corridor in these areas to minimize the strip of trees between the two easements. Abutting the easements would minimize the potential for tree wind throw hazards and subsequent maintenance requirements.
Lone Rock Timberlands Development MPs 20.0–29.5	Coos	The alignment between MPs 29.0 and 29.5 was modified to minimize impacts on Lone Rock Timberland's planned subdivision. The reroute would avoid impacts to a number of lots within the subdivision.
East Fork Coquille River MPs 29.8–39.1	Coos	New proposed route segment between MPs 29.8 and 39.1 avoids marbled murrelet (MAMU) habitat and MAMU Stands G46 and G47.
MAMU Stand G50 MPs 30.3–30.7	Coos	New proposed route segment between MPs 30.3 and 30.7 reduces impacts on MAMU Stand G50.
MAMU Stand C3088 MPs 31.7–32.3	Coos	New proposed route segment between MPs 31.7 and 32.3 reduces impacts on MAMU Stand C3088.
Hardwood Study Plot MPs 31.4–32.2	Coos	The alignment between MPs 31.4 to 32.2 was rerouted to avoid a long-term Hardwood Study Plot on BLM lands that is being studied by Oregon State University. The new proposed route was coordinated with the BLM.
MAMU Stand B07 MPs 36.0–36.3	Coos	New proposed route segment between MPs 36.1 and 36.3 reduces impacts on MAMU Stand B07.
MAMU Stand C3070 MPs 45.2–45.7	Coos	New proposed route segment between MPs 45.2 and 45.7 reduces impacts on MAMU Stand C3070.
Rust Parcel Subdivision MPs 49.3–49.8	Douglas	The alignment between MPs 49.5 and 49.8 was adjusted to minimize impacts on the landowner's planned parcel subdivision. The pipeline route and block valve locations were realigned to the edge of the parcel.
Brian and Darla Standley MPs 51.5–52.5	Douglas	Pacific Connector incorporated a minor route deviation between approximately MPs 51.5 and 52.5, east of Highway 42, to accommodate a landowner request/concern.

TABLE 3.4.4-1

Minor Deviations Incorporated into the Proposed Pipeline Route

Deviation Name/MPs	County	Rationale for Route Realignment
Kincaid's lupine MPs 57.8–57.9	Douglas	New proposed route segment between MPs 57.8 and 57.9 avoids population of Kincaid's lupine.
Transmission Tower MPs 79.2–79.7	Douglas	The alignment between MPs 79.2 and 79.7 was modified to avoid a transmission tower. The route of the minor deviation was dictated by topographic conditions and the presence of three transmission line crossings in this area.
St. Johns Creek Reroute MPs 88.1–90.0	Douglas	Pacific Connector's proposed reroute alignment crosses the creek in an area where the creek is not steeply incised and there is a minor floodplain on either side of the stream to facilitate the crossing.
NSO Nest Patch 094-8 MPs 95.1–95.6	Douglas	New proposed route between MPs 95.1 and 95.6 reduces impacts on old-growth forest and northern spotted owl (NSO) Nest Patch 094-8.
Landslide Hazards Nos. 34-35 MPs 108.5–109.0	Jackson	Route realigned to avoid landslide hazards.
Civil Survey Corrections MPs 110.8–111.1	Jackson	The alignment in this area was trued-up with actual civil survey data which ensured that the alignment approached the slope perpendicularly or head-on to the contours to minimize right-of-way grading requirements.
Gagnon MPs 118.7–123.3	Jackson	The alignment in this area (MPs 118.7 to 123.3) was adjusted based on landowner concerns/recommendations to move the alignment to the edge of the parcel/pasture.
Laudani MPs 123.1–123.3	Jackson	The alignment between MPs 123.1 and 123.3 was adjusted based on landowner concerns. In this area the alignment was moved upslope and away from residence as much as possible. Further, the TEWAs in this area were reduced in size and extent to minimize overall disturbance on the slope which was a concern of the landowner.
Mitchell Ranch Deviations MPs 127.4–127.8	Jackson	Minor reroute to avoid home site development.
Mucky Flats Reroute MPs 128.4–130.6	Jackson	Reroute to address landowner concerns with shallow groundwater, irrigation pastures. Landowner also proposed to extend private runway airstrip in Mucky Flats, which would have crossed the proposed pipeline route.
Obenchain Mountain MPs 130.0–132.1	Jackson	Reroute to address landowner concern and impacts to spring and seep water sources and developed pasture.
NSO Reroute MPs 127.4–128.6	Jackson	New proposed route segment between MPs 127.4 and 128.6 to avoid impacts on NSOs.
C-2 Ranch MPs 143.71–147.54	Jackson	Between MPs 143.71 and 147.54, the alignment crosses the C-2 Ranch, on which there are numerous irregularly-shaped conservation easements held by the Southern Oregon Land Conservancy (Conservancy). Pacific Connector met with the Conservancy and received GIS data showing the locations of the conservation easements. Pacific Connector adjusted the alignment to minimize the impacts on conservation easements, irrigated pastures, and irrigation facilities (canals/ditches). Mainline valve (MLV) #11 was also relocated to MP 145.2 adjacent to Gardner/Salt Creek Road and out of the view of Highway 140.
Heppsie Mountain Quarry MP 150.4–150.7	Jackson	Minor realignment (MPs 150.4 to 150.7) to avoid the Heppsie Mountain Rock Quarry on BLM lands.
Rogue River National Forest – S&M Species MPs 154.7–155.1 a/	Jackson	To avoid Survey and Manage (S&M) fungus species *Gymnomyces abietis* (GYAB), identified during surveys on the Rogue River National Forest, a minor route deviation was incorporated into the pipeline alignment.
Rogue River National Forest – S&M Species MPs 157.5–158.7 a/	Jackson	To avoid S&M fungus species *Sedecula pulvinata* (SEPU), identified during surveys on the Rogue River National Forest, a minor route deviation was incorporated into the pipeline alignment.
Rogue River National Forest – S&M Species MPs 162.5–162.8	Jackson	To avoid a cluster of S&M species, including *Albatrellus ellisii*, *Boletus pulcherrimus, Cortinarius olympianus*, *Gomphus kauffmanii*, and *Albatrellus dispansus,* a Forest Service strategic species.
Rogue River National Forest - S&M Species MPs 164.2–164.3	Jackson	To avoid a S&M fungus species *Hygrophorus caeruleus,* identified during surveys in 2009 on the Rogue River National Forest, a minor route deviation was incorporated into the pipeline alignment between MPs 164.2 and 164.3. The deviation moved the alignment and construction right-of-way to the south side of Forest Service Road 37200000.
Winema National Forest - S&M Species MPs 168.6–169.1	Klamath	To avoid S&M fungus species *Hygrophorus caeruleus* identified during surveys in 2009 on the Winema National Forest, a minor route deviation was incorporated into the pipeline alignment between MPs 168.6 and 169.1. The deviation moved the alignment approximately 500 feet to the north so that the construction right-of-way would avoid the species by approximately 100 feet at the crossing of Dead Indian Memorial Road.
Winema National Forest – S&M Species MPs 171.2–173.0 a/	Klamath	To avoid S&M fungus species *Choiromyces alveolatus* (CHAL), identified during surveys in 2009 on the Winema National Forest, a minor route deviation was incorporated into the pipeline alignment

TABLE 3.4.4-1

Minor Deviations Incorporated into the Proposed Pipeline Route

Deviation Name/MPs	County	Rationale for Route Realignment
Winema National Forest – S&M Species MPs 173.2–173.3	Klamath	To avoid S&M fungus species *Arcangeliella crassa*, identified during surveys in 2009 on the Winema National Forest, a minor route deviation was incorporated into the pipeline alignment between MPs 173.2 and 173.3. The deviation moved the alignment to the north so that the construction right-of-way would avoid the species by 125 feet or more.
McLaughlin Lane and Big Buck Lane MPs 187.3–191.8	Klamath	To avoid potential habitat for Applegate's milk-vetch and to avoid the houses in a residential neighborhood along McLaughlin Lane and Big Buck Lane.
Applegate's milk-vetch MPs 195.5–196.5	Klamath	New proposed route segment between MPs 195.5 and 196.5 avoids population of Applegate's milk-vetch.
Powerline Reroute MPs 202.3– 202.6	Klamath	The alignment in this area was shifted to minimize impacts to hayfields by realigning the pipeline adjacent to the powerline corridor.
Highway 39 Reroute MPs 210.3–211.6	Klamath	The alignment would more closely parallel State Highway 39 to minimize land encumbrances and to minimize pipeline traversing the middle of the fields in this area.
Powerline Reroute MPs 215.3–217.5	Klamath	The alignment was shifted upslope to parallel the powerline corridor more closely in this area, and to avoid a center pivot irrigation feature.
Lyons Center Pivot MPs 225.5–228.2	Klamath	The alignment in this area was rerouted to avoid impacts to the center pivot irrigated hayfield. Additionally, the reroute avoids an area that is expected to require blasting due to shallow and hard bedrock. The reroute was aligned along property line boundaries where feasible to minimize potential encumbrances.

a/ These reroutes have not been accepted by the Forest Service. See section 3.4.4.1 below.

3.4.4.1 Minor Deviations Recommended by the Land Management Agencies

The BLM and the Forest Service have worked with Pacific Connector to refine the proposed route in order to avoid impacts to critical resources on lands they manage. Minor route variations identified by the BLM but not yet incorporated into the proposed route include:

- route realignment between MPs 119.5 and 119.8 to avoid Riparian Reserve on a tributary to West Fork Trail Creek and comply with the ACS;
- route realignment near MP 126.0 to reduce impacts to the headwaters of Indian Creek and comply with the ACS; and
- route realignment near MP 131.5 to avoid Riparian Reserve and comply with the ACS.

Because Pacific Connector has not revised its proposed route at these locations, **we recommend that**:

- **<u>Prior to the end of the comment period on this EIS</u>, Pacific Connector should file with the Secretary documentation that it has realigned the pipeline route to adopt the minor route variations recommended by the BLM between MPs 119.5 and 119.8, at MP 126.0, at MP 131.5, and between MPs 183.9 and 187.4.**

Minor route variations identified by the Forest Service but not yet incorporated into the proposed route include the following.

- Route realignment between MPs 154.7 and 155.1 to avoid an S&M fungus species *Gymnomyces abietis* (GYAB), identified during surveys on the Rogue River National Forest. This realignment is necessary to comply with S&M standards and guidelines to maintain persistence of the species.
- A reroute between MPs 157.5 to 158.7 to avoid an S&M fungus species *Sedecula pulvinata* (SEPU), identified during surveys on the Rogue River National Forest. This

reroute is necessary to comply with S&M standards and guidelines to maintain persistence of the species.

- A reroute between MPs 171.2 and 173.0 to avoid S&M fungus species *Choiromyces alveolatus* (CHAL), identified during surveys on the Winema National Forest. This reroute is necessary to comply with S&M standards and guidelines to maintain persistence of the species.

Because Pacific Connector has not revised its proposed route at these locations, **we recommend that**:

- **<u>Prior to the end of the comment period on this EIS</u>, Pacific Connector should file with the Secretary documentation that it has realigned the pipeline route to adopt the minor route variations recommended by the Forest Service between MPs 154.7 and 155.1, MPs 157.1 and 158.7, and MPs 171.2 and 173.0.**

3.4.5 Compressor Station Alternatives

Pacific Connector's selection criteria for siting its proposed compressor station were:

- located near the eastern terminus based on pipeline hydraulics and expected fuel usage;
- proximity to interconnecting pipeline facilities;
- need for a relatively flat area, approximately 30 acres in size to accommodate planned facilities and provide a buffer from local development;
- proximity to a paved or all-weather access road, electrical power, and telephone connectivity;
- remote or sparsely populated area to minimize potential noise and visual effects;
- compatibility with existing land uses; and
- minimization of environmental impacts, such as avoidance of wetlands and sensitive habitat.

Besides the proposed location of the Klamath Compressor Station at MP 228.1, Pacific Connector identified two alternative locations: at MP 225.4 about 2 miles north of the proposed Klamath Compressor Station, and at MP 230.9 about 1.7 miles south (figure 3.4-14). In addition, Pacific Connector considered the design alternative of using electric-driven units at the proposed compressor station instead of natural gas burning units. Electric units would produce less noise and less air pollution than gas-burning units.

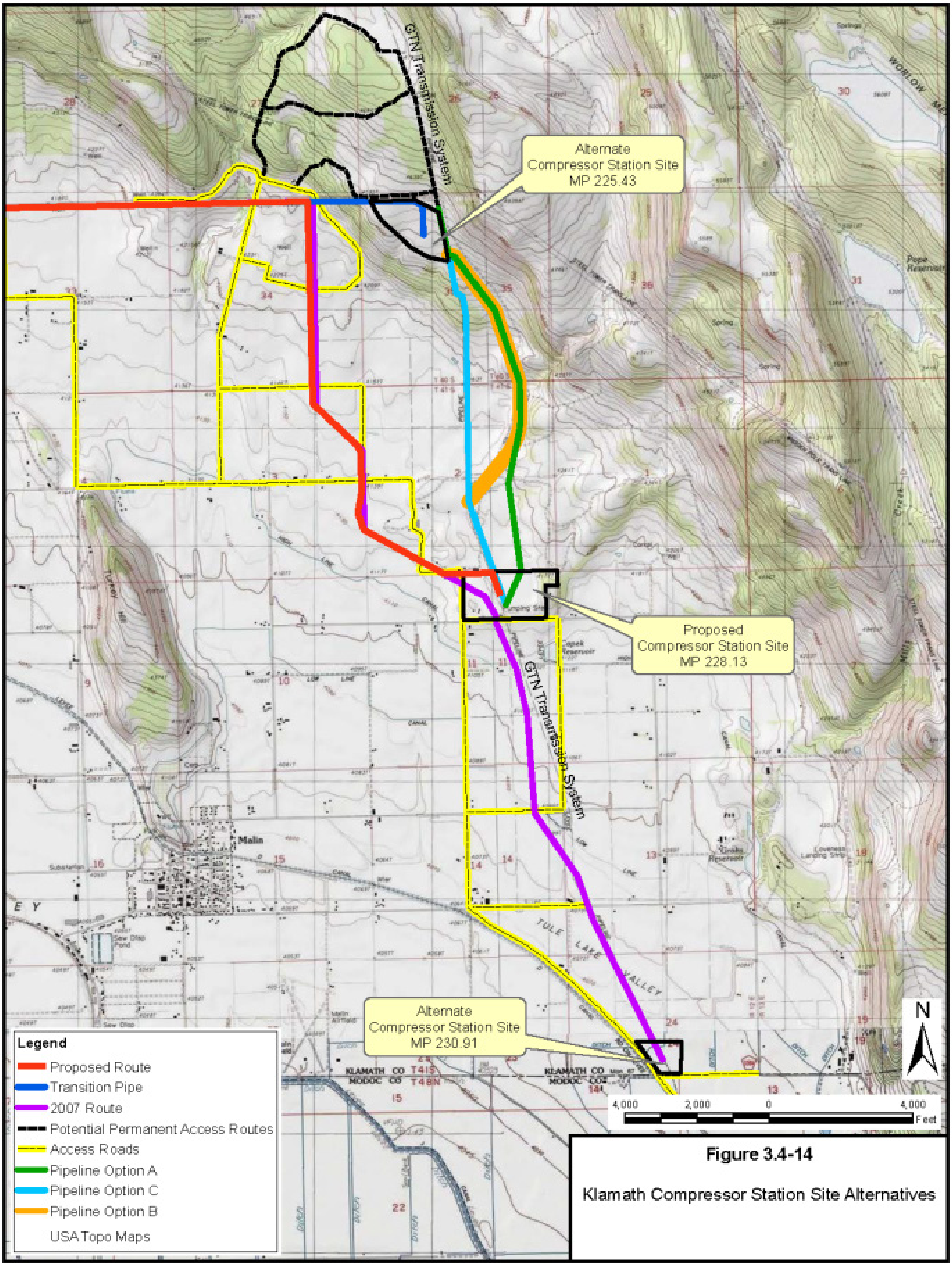

Figure 3.4-14

Klamath Compressor Station Site Alternatives

3.4.5.1 Northern Alternative Compressor Station Location

Pacific Connector evaluated an alternate compressor station site at MP 225.4, about 2.0 miles north of the proposed Klamath Compressor Station, in Section 35, T.40S., R.12E., Klamath County, Oregon, approximately 3.2 miles northeast of Malin. This alternate site is located on a bench adjacent to the GTN natural gas pipeline and a PacifiCorp electric line. The tract is on a hill, east of and topographically about 200 feet above the valley floor. It consists of rangelands with a few scattered juniper trees. Pacific Connector has identified an approximately 48-acre area suitable for siting a compressor station. The closest residence from the center of the site is approximately 0.7 mile to the northwest. This residence is about 150 feet in elevation below the alternative compressor station site, and is topographically screened from view from the site. Noise surveys and modeling have not been completed for this site. However, preliminary evaluations indicate that this alternative site may meet Oregon noise standards.

The additional facilities noted below would be required if this alternate site were selected.

- Upgrading between approximately 1.0 and 1.5 miles of existing dirt road for permanent all-weather access. Pacific Connector is evaluating three potential permanent access routes that are shown on figure 3.4-21 and utilize an existing all-weather road to a Pacific Power substation facility.
- An interconnect with the Ruby pipeline system near MP 228.1. The connection may require installation of pipe larger than 36-inches-in-diameter. Pacific Connector has identified three potential route options for the interconnecting pipeline, that are described below:
    1. Interconnect Pipeline Option-A is approximately 2.0 miles long and proceeds southerly to Ruby Pipeline's existing meter station at MP 228.1. This route deviates from the GTN pipeline to avoid irrigated croplands by crossing primarily rangeland vegetation and land use types.
    2. Interconnect Pipeline Option-B is also approximately 2.0 miles long and is similar to Option-A in that it proceeds southerly avoiding most irrigated cropland. The alignment avoids an irrigated center pivot field then converges with the GTN pipeline for approximately 0.6 mile of the alignment. Approximately 0.2 mile of the southern portion of this route would cross an irrigated field.
    3. Interconnect Pipeline Option-C is approximately 1.9 miles long and proceeds to the south, co-located entirely with the GTN pipeline. This alignment would cross two irrigated fields for approximately 0.8 mile. Pacific Connector has discussed this alignment with the landowner of the center pivot irrigated field, and he is adamantly opposed to this route.

Selection of the alternate compressor station site at MP 225.4 would eliminate the need to construct the proposed Pacific Connector pipeline between MPs 225.4 and 228.1 (2.7 miles), which crosses through primarily irrigated croplands.

3.4.5.2 Southern Alternate Compressor Station Location

Pacific Connector evaluated a potential alternate compressor station site at MP 230.9. The Southern Alternative Compressor Station site would be adjacent to the Oregon/California state line and approximately 2.7 miles southeast of Malin, in Section 24, T.41S., R.12E., in Klamath

County, Oregon. The parcel is an alfalfa field immediately north of County Road 108A. This site is the same as the formerly proposed Tule Lake, Russell Canyon, and Buck Butte meter stations in Klamath County, Oregon previously analyzed in the FERC's May 2009 FEIS for Docket No. CP07-441-000. The Tule Lake, Russell Canyon, and Buck Butte meter stations are not part of the current proposal under Docket No. CP13-492-000, and would be replaced by the Klamath-Beaver and Klamath-Eagle meter stations to be located within the proposed Klamath Compressor station at MP 228.1.

The Southern Alternative Compressor Station site was eliminated from further consideration for the following reasons:

- it was recently encumbered by construction of the Ruby Pipeline aboveground facilities, reducing available space;
- it would require construction of 2.5 more miles of pipeline, affecting 11 additional landowner parcels; and
- it would permanently remove agricultural land on prime farmland soils from crop production.

3.4.5.3 Electric Motor–Driven Compressor Units Alternative

As an alternative to the proposed natural gas driven compressors, Pacific Connector has worked with the local electric distribution company to determine feasibility and cost of power for electric motor–driven (EMD) compressors. Sufficient power is available in the area but transmission line(s) and a substation would have to be constructed to the compressor station. Three motors (13,200 hp each) would be required, one for each compressor. Only two would be in service at any time. For the EMD alternative, dedicated 230-kV transmission lines would have been identified to provide the total load and voltage needs for the Klamath Compressor Station. The total load would be 27.6 MW. The demand would be for two motors with the assumed power demand for the start of the first motor at 15 megavolt ampere (MVA), with a 0.85 power factor followed by a start of the second motor with the first motor operating normally at a total of 30 MVA at a 0.85 power factor.

The provision of the required power for operating EMD compressors would require that an approximately 2-mile-long 230-kV line be constructed to the compressor station from Pacific Power's line 70 that traverses between the Klamath Falls and Malin substations, as well as the installation of an approximately 500-foot by 500-foot (approximately 6-acre) substation. The substation would contain a 230-kV circuit breaker, two 30 MVA transformers, and 12,740-volt metered delivery from each transformer to the compressor station.

Comparatively, for the proposed natural gas–driven turbine, power would be obtained from a multi-customer distribution line, probably in the 25-kV class. Pacific Connector has not made a formal request for service, but Pacific Connector believes (subject of informal discussions with the utility) that the required power could be supplied from existing lines. The power required for the natural gas–driven turbines would be less than 1 MVA, compared to 26 MVA for the EMD option.

3.4.5.4 Conclusions about Compressor Station Alternatives

Oregon has a noise standard (OAR 340-035-0035(1)(f)) for new sources located at previously unused sites. Pacific Connector completed noise surveys and modeling at the proposed Klamath Compressor Station that indicate that the Oregon noise standard would not be achievable at this location, even after the application of advanced acoustical mitigation measures. However, Pacific Connector stated that the standard only applies to "industrial and commercial noise sources," and should not be applicable to a commodity conveyance utility such as a pipeline. Further, in 1991, the Oregon legislature terminated funding for the ODEQ's administration of the state noise regulation. Since the state can no longer provide site-specific variances or exemption procedures, Pacific Connector believes that the Oregon noise regulation would be unenforceable and would pose an unreasonable impediment to the Project. Therefore, only the FERC noise standards should be applied to the Project.[16] The FERC staff agrees that, in this situation, the FERC noise standards would take precedence over the Oregon regulations. As discussed in section 4.12.2.4 of this EIS, we calculated that noise from the Klamath Compressor Station would average between a day-night sound level (L_{dn}) of 56.1 and 47.5 A-weighted decibels (dBA) at the five closest residences. The FERC standard of an L_{dn} of 55 dBA at noise sensitive areas (NSA) would be met at the proposed Klamath Compressor Station, with the exception of NSA 1. However, Pacific Connector has reached an agreement with the landowners to purchase the property at NSA 1.

We conclude that the use of the EMD alternative may not offer significant environmental advantages over the use of gas-burning compressors at the proposed Klamath Compressor Station. While there are no direct air emissions from EMD compressors, there are indirect emissions associated with generating power at the electric power plant. Depending on its fuel source, the indirect emissions from the power plant may or may not be higher than the direct emissions from the gas-fired compressors at Klamath Compressor Station. The natural gas–driven turbine system would require less electric power and avoid the construction of a new powerline and substation required by the EMD alternative.

The Southern Alternative Compressor Station location would not be environmentally preferable because it would require the additional construction of 2.5 more miles of pipeline; would convert prime farmland to industrial purposes; and the proposed Pacific Connector facilities may conflict with the existing Ruby facilities at the site. While the Northern Compressor Station location could possibly meet the Oregon noise standards, use of that site would require about 2 miles of additional 42-inch-diameter piping, and another new access road. The proposed Klamath Compressor Station would be in compliance with the FERC noise standards. Noise and visual impacts on nearby NSAs would be reduced by measures implemented by Pacific Connector, including slatted fence and vegetative screening, as further discussed in sections 4.8.2.2 and 4.12.2. The proposed Klamath Compressor Station would offer direct access to the GTN and Ruby systems. It would be located on a relatively flat hayfield. We conclude that the alternative compressor station locations do not offer any significant environmental advantages over the proposed site of the Klamath Compressor Station.

[16] Oregon noise standards are discussed in sections 4.12.2.2 and 4.12.2.4 of this EIS; these standards limit increases to 10 dBA above the ambient background L_{10} and L_{50} noise levels at nearby NSAs. Pacific Connector contends that if the Oregon standards were applied to its Project, the company would have to purchase nine residences closest to the Klamath Compressor Station. In Section 10.5.4 of Resource Report 10 in its June 2013 application to the FERC, and in its September 16, 2013, response to the FERC's August 16, 2013, data request, question 84, Pacific Connector explained its position that the Oregon noise regulations should not be applicable to its Project, and that the FERC noise standards should take precedence.